

# FLIGHT

The  
AIRCRAFT ENGINEER  
AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD

Founded in 1909 by  
Stanley Spooner

DEVOTED TO THE INTERESTS,  
PRACTICE AND PROGRESS OF  
AERIAL LOCOMOTION AND  
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#### DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- May 31. *Conversazione* and "Stalling." Wilbur Wright Memorial Lecture, by Prof. B. Melvill Jones, before R.Ae.S.
- May 31. Celebration Banquet, Guildhall, Hull, on occasion of First International Air Service (Hull-Amsterdam).
- June 1. Entries close at 12 noon for London-Melbourne Race.
- June 2. Brooklands Air Race Meeting.
- June 2. Brooklands "At Home."
- June 3. London Aeroplane Club Garden Party, Hatfield.
- June 9. Reading Ae.C. Annual "At Home."
- June 16. R.A.F. Reserve Flying Club Annual Flying Display, Hatfield.
- June 23. Lancashire Ae.C. Air Display, Woodford.
- June 23. Henly Rally, Heston Airport.
- June 30. Royal Air Force Display, Hendon.
- July 3-9. 4th International Congress for Applied Mechanics, Cambridge.
- July 7. Opening of Leicester Airport.
- July 8. French International 12-Hours Reliability Trial.
- July 13-14. King's Cup Race. Start and finish at Hatfield.
- July 21. Round the Isle of Wight Air Race.
- July 21-22. French Grand Prix.
- July 28. Bristol and Wessex Ae.C. Garden Party.
- July 29. London-Sherburn Race (York County Aviation Club).
- Aug. 11. London-Newcastle Race (Newcastle-on-Tyne Ae.C.).
- Aug. 15. Air Tour of Italy.
- Aug. 17-Sept. 6. Copenhagen Aero Show.
- Aug. 18. Cotswold Aero Club Air Rally and Garden Party.
- Aug. 25. Liverpool and District Ae.C. Garden Party, Speke Aerodrome.
- Aug. 28-Sept. 16. International Touring Competition, Poland.
- Sep. 1-2. Cinque Ports Flying Club International Rally, Lympne.

## Empire Air Day

IT was almost inevitable that, with all eyes directed towards our Air Force, and with the tremendous efforts of the Air League, the first Empire Air Day should have been a success. Few could have expected that it would be the overwhelming success it was. At every aerodrome open to the general public on May 24th visitors availed themselves of the opportunity afforded of seeing what "all this air talk was about." Generally speaking, they were met with obvious willingness to show them around. At airports no less than at the more modest club aerodromes, the public saw glimpses at least of the daily work that goes on. At Royal Air Force stations they saw our "First Line of Defence" doing its daily routine (more or less) training. There can be no doubt that, on the whole, the British public appreciated the privilege of Empire Air Day, even if it did not altogether realise the reasons for its institution.

Air Commodore J. A. Chamier, Secretary-General of the Air League of the British Empire, deserves the thanks of the aviation community for having inaugurated Empire Air Day, and he and his staff, as well as all those others who worked so hard to make the day a success, did magnificent service. There is every reason to be pleased with the first results, but being pleased does not necessarily mean being satisfied. Otherwise there would be no progress. In future we must do still better.

We believe that in the Air Ministry there was originally a certain amount of opposition to the idea of admitting the public to R.A.F. stations and aerodromes. That was, perhaps, inevitable. The whole idea was new, and it is not possible to receive hundreds of visitors at a station without causing the work of the squadrons to suffer somewhat. But that is a small enough price to pay. To know the work of the Royal Air Force is to be interested in it, and to be interested is to like it. The greater numbers of John Citizen and his wife can be brought to appreciate what the R.A.F. stands for, the better for the next Air estimates.

On the civil side there was little to find fault with, except that, perhaps, the idea of the importance of British Empire air routes was not sufficiently impressed. It is not easy to determine exactly how

this should best be done, but it is very essential that it is done. No nation in the world has more to gain from extensive use of air transport than has the British Empire, and it will, we fear, require something more sustained than an annual day to bring this fact home to the general public. Reduced air mail rates, the introduction of air mail stamps, and a much wider publicity of the time-saving which the air mail offers will have to be called into service if the Nation is to be taken well out of the apathy from which it is only just beginning to struggle.

The appeal to firms to open their works to the public did not meet with the response which it deserved. One knows that dislocation is inevitable, and that much of the work is of such a confidential nature that it should not be shown to the crowd. But the difficulties are not unsurmountable. Next year a greater effort should be made to let the public see what it is always being told, that British aircraft and aero engines are the best in the world. A walk through our factories, watching the meticulous care bestowed on every small item that goes into an aeroplane, would go a long way towards convincing the onlooker of the truth of the claim.

## The King's Cup

**S**AVE for possible last-minute entries, the list of machines which may be expected to take part in the race for the Challenge Cup presented by His Majesty the King, which is to be flown on July 13th and 14th, is now complete. From the announcement of the Royal Aero Club, it would appear that some forty machines will face the starter's red flag, and at the moment there are thirty-eight entries, which, curiously enough, is exactly the same number as appeared in last year's final list. One or two may still be announced, and it may be assumed that one or two will be scratched, so that the "field" promises to be almost identical. With the regulations in force, this number is fairly easily handled, and "bunching" at turning points, once the bugbear of the race, should not be serious.

Details of the course, with a sketch map, were published in FLIGHT of May 17th. Once more the start and finish will be at the de Havilland aerodrome at Hatfield, and the courses will radiate from there. They will total about 800 miles, which is approximately thirty miles shorter than last year's course. In 1933, it may be remembered, the entire race was flown in one day, but it was found that the public did not assemble at Hatfield in considerable numbers until the afternoon, towards the time when the Final was being flown, and the suggestion was made in these columns that this year the race might be flown on two days—the earlier heats being flown off on the Friday, and the semi-final and the final on the Saturday. This suggestion has been adopted, and the first two circuits will be flown on Friday, July 13th, and the third and fourth on Saturday, July 14th. We feel sure this arrangement is a wise one.

Last year's race was won by Capt. Geoffrey de Havilland on a "Leopard Moth" with "Gipsy Major" engine at a speed of 139.51 m.p.h. "D.H." proved an early favourite, and his win was extremely popular, though until the handicap allow-

ances are announced it is clearly impossible to venture any forecast this time, particularly as the entry list contains some very interesting types of aircraft.

Last year, too, H.R.H. Prince George entered a Percival "Gull" fitted with Napier "Javelin" engine, and this year he has again entered one of Capt. Percival's machines, a "Mew Gull" fitted with a "Gipsy Six" engine. This machine, in which the pilot sits very far back, almost in the tail, has not been seen in public since the first example was shown to press representatives at Gravesend aerodrome some months ago. With its 200 h.p. six-cylinder air-cooled inverted engine it should attain nearly 200 m.p.h. Another machine with a speed of similar order is the Comper "Streak" ("Gipsy Major"). It is true that in the Coupe Deutsch this machine did not do well, but it is difficult to believe that it was at its best, and by July 13th Comper will probably have found a few more "knots." In the 200 m.p.h. class, also, should be the Airspeed "Courier" fitted with the 300-350 h.p. Napier "Rapier" engine. This engine, it will be recalled, has 16 air-cooled cylinders arranged in the form of a letter "H."

Something of a "dark horse" is the Hendy "Heck." This machine, which will be fitted with a 200 h.p. de Havilland "Gipsy Six" engine, has been designed by Mr. Basil B. Henderson for Mr. Whitney Straight, the racing motorist. Like so many modern machines, the "Heck" is a two-seater low-wing cantilever monoplane, with retractable undercarriage.

Space does not allow us to refer to all the machines entered, but a glance through the list published on page 541 serves to indicate the fact that quite a number of the machines should accomplish something like 160 m.p.h. Not that speed in itself will necessarily mean anything much in the race—that depends mainly upon the handicappers—but it is always more interesting to watch fast aeroplanes.

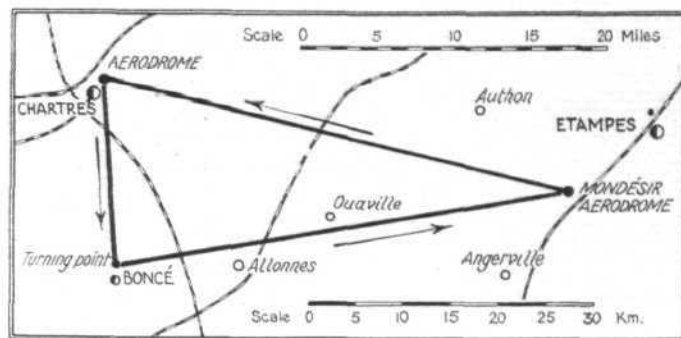
For a good many years now the de Havilland company has brought out a new type for the King's Cup Race. This year the King's Cup type figures in the entry list as a "Coupé Moth" with "Gipsy Major" engine. From this one might well infer that it is merely an ordinary "Moth" fitted with coupé top. This, however, is far from being the case. The machine may be described as a small single-engined version of the "Dragon," with cabin accommodation for two people seated side-by-side. The biplane wings have the pronounced taper of the "Dragon," but the single "Gipsy Major" engine is, of course, placed in the nose of the fuselage.

Another de Havilland machine about which there seems to be some mystery is the T.K.1. This machine is a straightforward biplane, with two occupants placed tandem-fashion. It was completely designed and built by the pupils of the de Havilland Technical School, under the guidance of Flt. Lt. Clapp and Mr. Langley.

Everyone will be glad to see that once more Lord Nuffield has entered his three Hawker "Tomtits" with Wolseley A.R.9 nine-cylinder radial air-cooled engines of 200 h.p. In last year's race these machines were not fortunate enough to get into the final, although Mr. G. E. Lowdell did get into the semi-final, with a speed of 137½ m.p.h. It is to be hoped that they will have better luck this year.

# COUPE DEUTSCH

1st, Arnoux on Caudron-Renault, 241.7 m.p.h.  
 2nd, Massotte on Caudron-Regnier, 224.3 m.p.h.  
 3rd, Monville on Caudron-Renault, 209.4 m.p.h.



**P**ILOTING a Caudron low-wing cantilever monoplane, 1934 type, equipped with a new 300-h.p. Renault six-cylinder, in-line, inverted, air-cooled, direct-drive engine, Maurice Arnoux won the Deutsch de la Meurthe Race on Sunday last. It consisted of a distance of 2 000 km. (1,242 miles), which was divided into two sections of 1 000 km. (621.37 miles) each, with an hour's interval between them. The course was a triangular one of 100 km. (62.12 miles), beginning and ending at the Etampes-Mondésir Aerodrome. Arnoux covered the 2 000 km. in 5 hr. 8 min. 31 sec., at an average speed of 389 km./hr. (241.7 m.p.h.) Louis Massotte finished second in 5 hr. 32 min. 28 sec., having flown at 361 km./hr. (224.3 m.p.h.). He also piloted a Caudron plane, but of 1933 construction, entered by the Regnier Engine Co. and equipped with a 217-h.p. Regnier six-cylinder, in-line, inverted, air-cooled, direct-drive engine. A second Caudron entry, piloted by Albert Monville, and equipped also with a new Renault six-cylinder engine, came in third, having covered the course in 5 hr. 51 min. 52 sec., at an average speed of 337 km./hr. (209.4 m.p.h.). All these machines thus beat the record of 323 km./hr. (201 m.p.h.) for the 2 000 km. made at the Deutsch Cup Race last year by Georges Détré on a Potez plane, equipped with a 270-h.p. Potez air-cooled radial engine.

Favoured by fine weather, and with reports that new speed records for light planes would probably be established, a large crowd was in attendance, including numerous high aviation officials, constructors, foreign attachés, etc. The Air Minister, General Denain, was among the early arrivals, flying over from Villacoublay in a Dewoitine three-engined colonial type transport cabin monoplane. The President of the Republic, Mr. Albert Lebrun, also attended the race in the afternoon, coming from Paris by car, but returning later with General Denain in the Dewoitine. Mlle. Suzanne Deutsch de la Meurthe, the donor of the Cup, was likewise a prominent

arrival, and remained on the aerodrome the entire day.

The race was started a few minutes after 9 a.m. by Chief Engineer Louis Hirschauer, Assistant Director of Commercial Aviation in the Air Ministry. Georges Détré, winner of the Deutsch Cup last year, piloting the Potez type 53-2 plane, was the first to take off. His engine having a fixed-pitch propeller, Détré required practically the whole length of the field, some 1 000 m., in which to take off. He made eight circuits of the 100-km. course in good style, and then a defective oil pipe forced him to land and abandon the race.

Lemoine, flying the Potez type 53-3, was the next to take off. This he did in about one-half the distance required by Détré, as his engine had a variable-pitch propeller. He made the first ten circuits of the course, comprising the first section of the race, at an average speed of 368 km./hr. (228.7 m.p.h.). When, however, Lemoine tried to start in the afternoon for the second section of the race, he could not get his variable-pitch propeller to remain in the low-pitch position desired for starting. As he was also somewhat affected by the exhaust gases from the engine, Lemoine decided to abandon the race.

Massotte, piloting the Regnier-Caudron machine, was the next to take off. His average speed was 365 km./hr. (226.8 m.p.h.) for the first ten circuits. Delmotte was the first of the Caudron pilots to get away, which he did in good style, and he made some beautiful steeply-banked turns as he rounded the pylon in front of the judges at the Airport. He flew somewhat lower than the other pilots, and made the excellent average of 387 km./hr. (240.5 m.p.h.) for the first ten rounds of the course in the morning. On the 19th turn of the course in the afternoon, when within about 50 km. (31 miles) of the finish-

ing line, engine trouble developed, and Delmotte was forced to land and abandon the race. He landed without physical injury to himself.



**THE 1934 WINNER:** Maurice Arnoux, who was in the Deutsch Cup Race last year, but whom a broken undercarriage then prevented from completing the race.



**BRINGING IN THE WINNER:** The Caudron C.460 is fitted with a supercharged Renault 6-cylinder in-line air-cooled engine of about 310 h.p.



**DOGGED BY ILL LUCK:** The two Potez machines entered were unfortunate, one having to land with a broken oil pipe, and the other being put out of the race by his "two-step" propeller insisting on remaining in the high-pitch position for the take-off.

Another Caudron pilot, Lacombe, punctured one of the tyres of his undercarriage, and as he was thus obliged to start very late, he decided to withdraw after having made a few turns of the course.

Monville, who was also flying a Caudron entry, made an average of 317 km./hr. (197 m.p.h.) in the morning, but increased this in the afternoon, and finished third, with an average of 337 km./hr. (209.4 m.p.h.).

Flt. Lt. N. Comper, the only English competitor, was the next to take off, which he did in very good style, within about 250 yards. He made the ten circuits of the course required in the morning with his undercarriage retracted, at an average speed of 270 km./hr. (172.7 m.p.h.). In the afternoon, however, some trouble developed, and he was obliged to leave the landing undercarriage down. As he considered this to be too great a handicap, Comper also withdrew from the race after making some six circuits of the course in the afternoon.

Arnoux, the winner of the contest, started last and flew a splendid race. Equipped with a Ratier variable-pitch propeller, his machine took off easily and kept up a good speed throughout the race, completing the ten circuits of the course in the morning at an average rate of 393 km./hr. (244 m.p.h.).

#### Technical Progress

From a technical point of view, the outstanding feature of the 1934 machines was that extensive use was made of split flaps and variable-pitch propellers. This resulted in much better take-offs, and also brought the landing speed down to reasonable figures. For the Caudron Company the day was one of triumph, the machines of this famous French designer getting first, second and third place. In

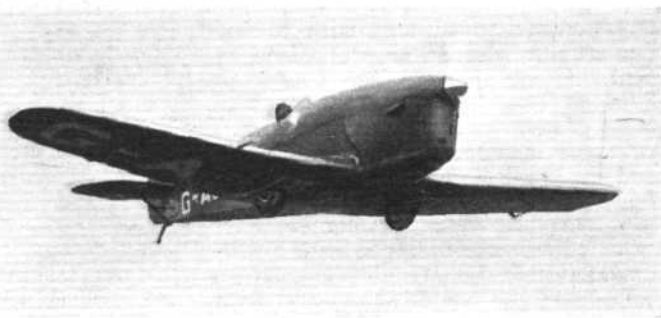
the Caudron machines built specially for this year's race, the split flaps have a chord 30 per cent. of that of the main wing chord, and a length of approximately 60 per cent. of the wing span. They had retractable undercarriages, but these were not used, as some difficulty was experienced with the operating mechanism, and the Caudron machines all flew in the race with the undercarriages "down." None of the French machines had been approved by the *Service Technique*, and none of the French engines had passed C. of A. tests, and it was left entirely to the constructors to follow their own ideas and build what they thought best.

For the Renault Company also the 1934 Coupe Deutsch was a success. These engines were developed from the four-cylinder "Bengali" of last year by adding two more cylinders. They are air-cooled, in-line, inverted engines, and were designed for a maximum of 325 h.p. and 3,250 r.p.m. In the race they were being run at from 2,850 to 2,900 r.p.m., at which speed they developed about 290 b.h.p. For the race, the Shell Company supplied a special fuel with an octane figure of approximately 100.

It was to be regretted that the Potez Company, one of whose machines won the race last year, were so unlucky. One of them retired from the race with a broken oil pipe, and the other had trouble with his variable-pitch propeller, which refused to remain in the low-pitch position for the take-off.

The nine-cylinder, radial air-cooled Potez engines were run in the race at about 2,800 r.p.m., at which speed they were said to develop 350 b.h.p. Like the Renault engines, they were supercharged, but the Potez superchargers ran at very much greater speed, i.e., 11 times engine speed instead of 7.6 times engine speed. It does not appear that engine trouble in the ordinary sense was responsible for the retirement of the two Potez machines.

R. C. W.



**OUTCLASSED:** The Comper "Streak," with its 140-h.p. engine, was not a match for the supercharged French competitors, and when the undercarriage refused to retract, Flt. Lt. Comper retired after a game struggle.

#### PARTICULARS OF COUPE DEUTSCH COMPETITORS

Racing No.	Pilot	Aeroplane and Engine	Span	Area	Total weight	Wing loading	Power loading	*Under-carriage
			ft. m.	sq. ft. m. <sup>2</sup>	lb. kg.	lb./sq. ft. kg./m. <sup>2</sup>	lb./h.p. kg./h.p.	
1	Détré	Potez P532 ("Potez")	23.6 (7.2)	86.1 (8)	1962.1 (890)	22.7 (111)	6.6 (3)	R
3	Lemoine	Potez P533 ("Potez")	23.3 (7.1)	81.8 (7.6)	2039.3 (925)	25.0 (122)	5.7 (2.6)	R
4	Massotte	Caudron C3 ("Régnier")	22.3 (6.8)	75.3 (7)	1653.5 (750)	21.9 (107)	7.0 (3.2)	F
6	Delmotte	Caudron C460 ("Renault")	22.0 (6.7)	75.3 (7)	1929.0 (875)	25.6 (125)	4.2 (2.9)	R
7	Lacombe	Caudron C460 ("Renault")	22.0 (6.7)	75.3 (7)	1929.0 (875)	25.6 (125)	4.2 (2.9)	R
10	Monville	Caudron C460 ("Renault")	22.0 (6.7)	75.3 (7)	1929.0 (875)	25.6 (125)	4.2 (2.9)	R
12	Comper	Comper "Streak" ("Gipsy Major")	23.6 (7.2)	79.6 (7.4)	1499.1 (680)	18.8 (92)	9.9 (4.5)	R
13	Arnoux	Caudron C450 ("Renault")	22.0 (6.7)	75.3 (7)	1929.0 (875)	25.6 (125)	4.2 (2.9)	F

\* R = retractable.

F = fixed.

#### U.S. AIR MAIL CONTRACTS

THE Aviation Corporation (Cord interests), owner of American Airways, has just founded an air transport company with a capital of five million dollars, to be known as American Air Lines, Inc. It is probable that the new company will make a bid for the operation of an air mail service. The United Aircraft & Transport Corporation has announced the reorganisation of, and the subsequent separation from United Air Lines, in order that it may bid

for the temporary air mail contracts. The Post Office Department of the United States has announced that it is prepared to receive bids on four air mail routes. These are from Newark (N.Y.) to Chicago (a former "United" service), from Fargo to Seattle (formerly operated by North West Airways), from Fort Worth to Los Angeles (formerly flown by American Airways) and from Detroit to Milwaukee (formerly operated by Kohler Air Lines).



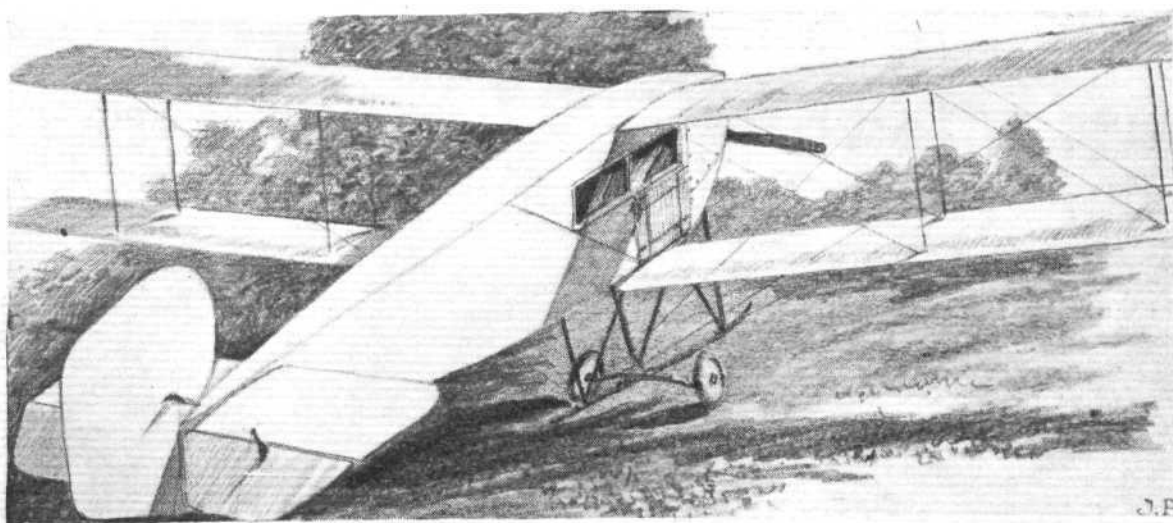
## THE AVRO "COMMODORE"

*Car comfort, an ultra-reliable engine, a modest power expenditure, and a performance which should satisfy a very large number of purchasers, are the main features of the latest Avro machine*

**T**O the large range of types produced by A. V. Roe & Co., Ltd., has recently been added a cabin biplane 4-5 seater with Siddeley "Lynx" 7-cyl. radial air-cooled engine. A photograph of this machine, the type 641, was published in FLIGHT of May 10. It has now become possible to give a detailed description of the Avro "Commodore," as the type has been called. The machine is a heavily-staggered cabin biplane of metal construction, in the design of which the aim was comfort and robustness rather than high performance. Realising that in a single-engined machine likely to be used for extensive tours at home and abroad, engine reliability would be of vital importance, the power plant chosen

for the "Commodore" was the Siddeley "Lynx" of 215 b.h.p., one of the most reliable aero engines ever produced. As comfort was the primary object, the *conduite interieure* arrangement of the cabin was adopted, and by using the very pronounced wing stagger familiar from other Avro types, the view from the cabin has been made exceptionally good, notwithstanding the large N.A.C.A. cowling ring which surrounds the radial engine.

As an example of progress, it is of interest to recall that A. V. Roe & Co. was the first British firm to produce a cabin machine. This was a monoplane with Viale radial air-cooled engine, and was first flown by the late Lt. Parke, R.N. It was followed, in 1912, by a biplane fitted



**THE FIRST AVRO ENCLOSED BIPLANE :** This machine, fitted with a 100-h.p. Green 4-cylinder water-cooled engine, was entered in the Military Trials, Salisbury Plain, in 1912.



THE BUSINESS END : The Siddeley "Lynx" is enclosed in a N.A.C.A. cowling. An electric starter is fitted.

# THE AVRO "COMMODORE" 215 h.p. Siddeley "Lynx" Engine

## Dimensions

	ft.	in.	m
Length o.a.	27	3	(8,33)
Height o.a.	10	0	(3,05)
Wing span (both)	37	4	(11,40)
Wing chord (both)	4	9	(1,45)
Gap	5	3	(1,60)
Dihedral angle	2.5	deg.	
Angle of incidence	3.25	deg.	

## Areas

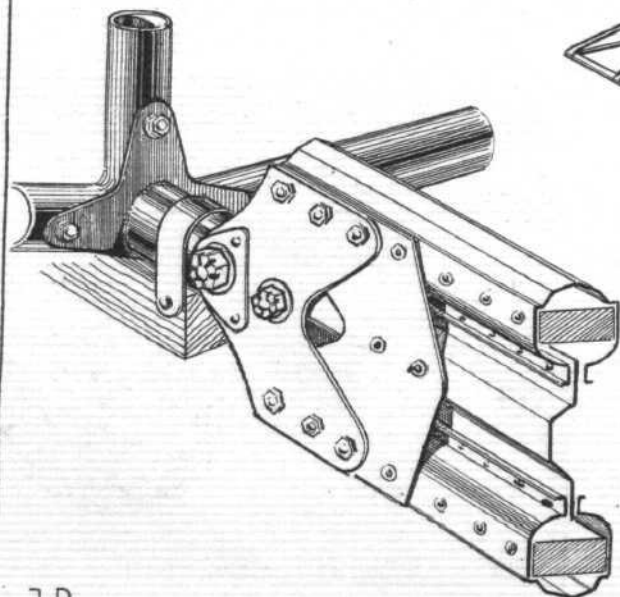
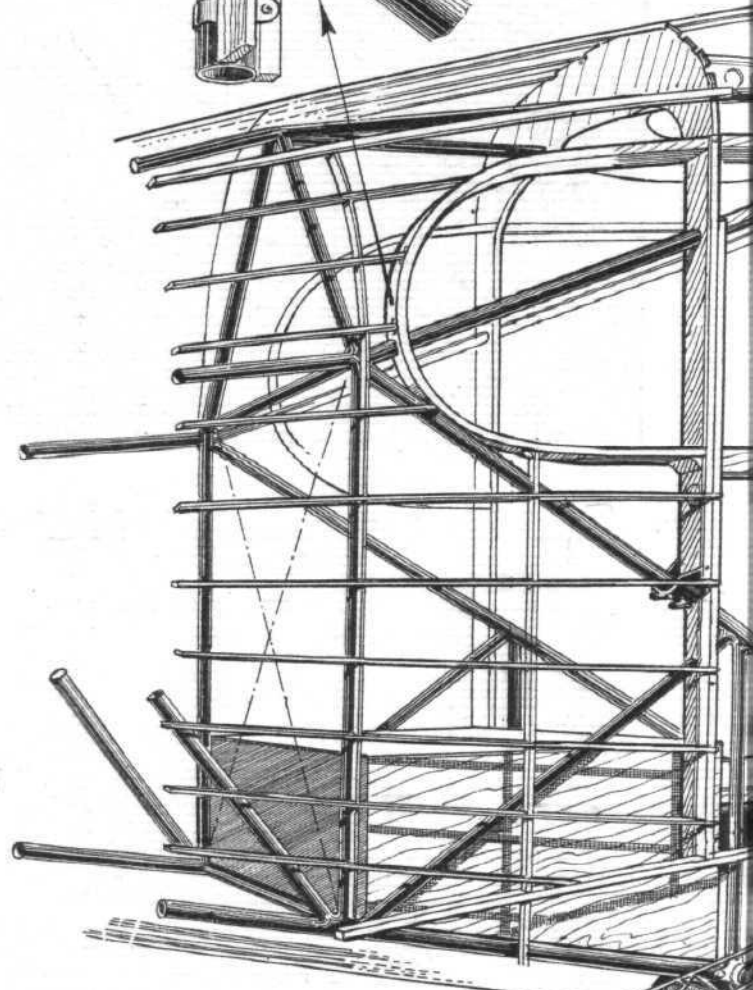
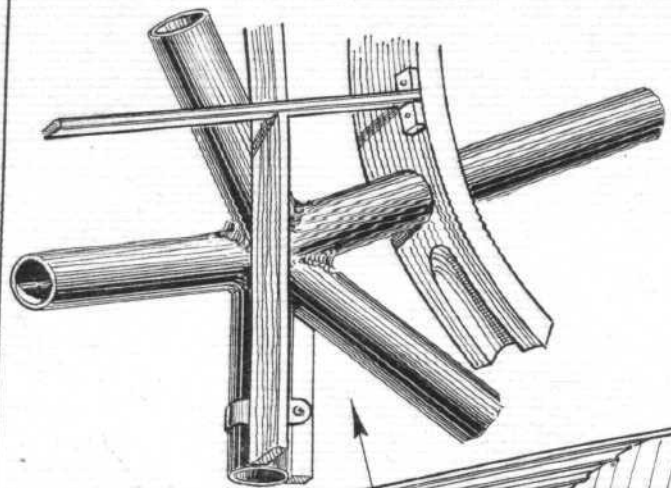
	sq. ft.	m <sup>2</sup>
Wings (incl. ailerons)	307.0	(28,5)
Ailerons (total)	31.5	(2,92)
Tail plane and elevator	39.6	(3,67)
Rudder	12.0	(1,11)
Fin	3.3	(0,31)

## Weights

	lb.	kg.
Tare weight, incl. cabin furnishing	2,225	(1 009)
Pilot	160	(72,5)
3 Passengers at 160 lb.	480	(217,7)
Baggage	209	(94,8)
Fuel (49 gals. = 223 l)	377	(170,9)
Oil (5 gals. = 23 l)	49	(22,2)
Total disposable load	1,275	(578)
Gross weight	3,500	(1 587)
Wing loading	10.82 lb/sq. ft.	(5,28 kg/m <sup>2</sup> )
Power loading	15.45 lb/h.p.	(7,02 kg/CV)

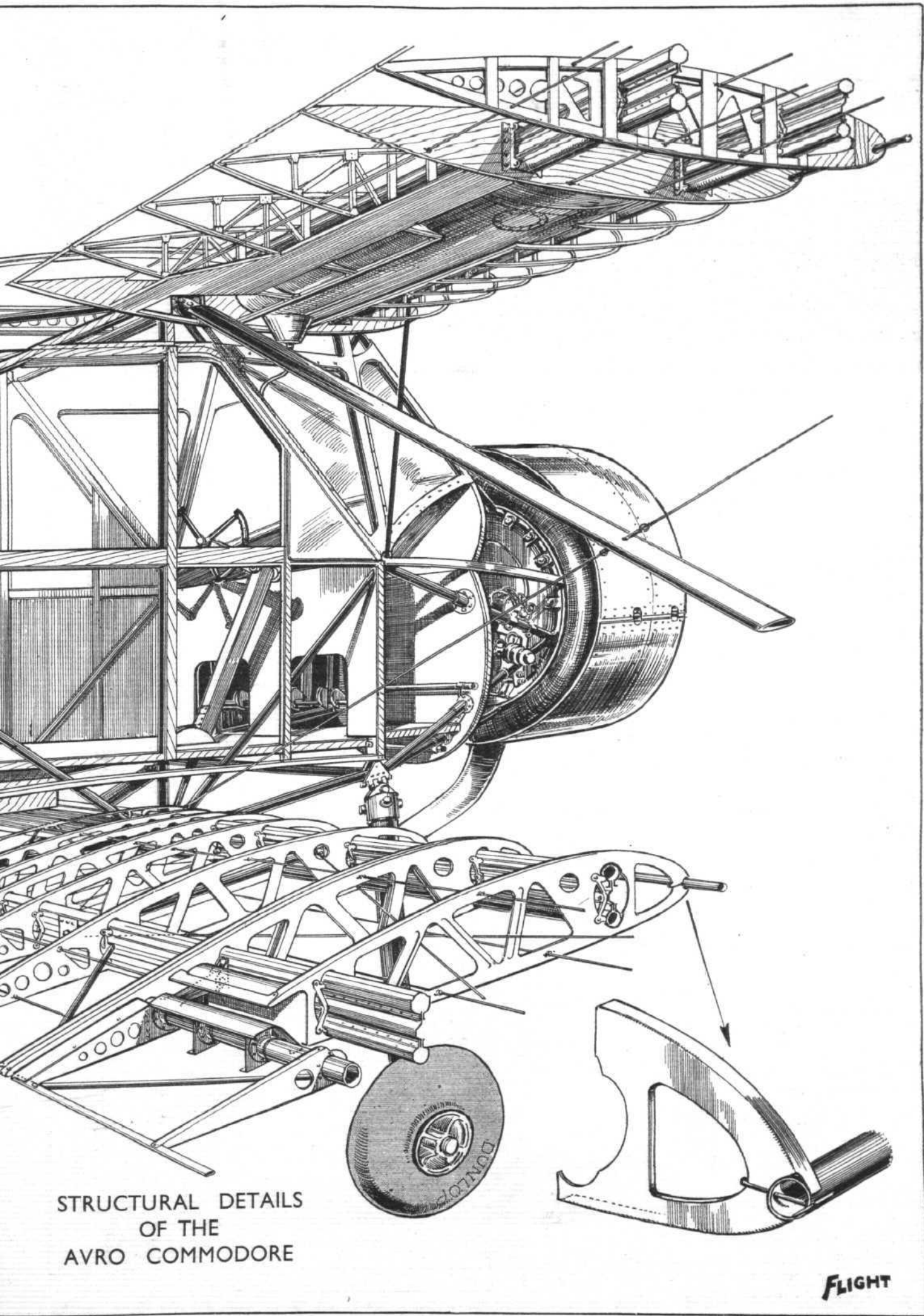
## Performance

Max. speed at sea level	130 m.p.h.	(209 km/h.)
" " 5,000 ft. (1 524 m.)	124	(200 " )
" " 10,000 ft. (3 048 m.)	115	(185 " )
Cruising speed at 1,000 ft. (305 m.)	110	(177 " )
Landing speed	50	(80 " )
Initial rate of climb	700 ft./min.	(3,57 m/sec.)
Time to 1,000 ft. (305 m.)	1.60 min.	
" 5,000 ft. (1 524 m.)	9.50 min.	
" 10,000 ft. (3 048 m.)	28.00 min.	
Service ceiling	11,500 ft.	(3 505 m.)



J.P.

The larger sketch shows the arrangement of the main fuselage and wing structure members, while the smaller sketches illustrate some of the details.



STRUCTURAL DETAILS  
OF THE  
AVRO COMMODORE

FLIGHT

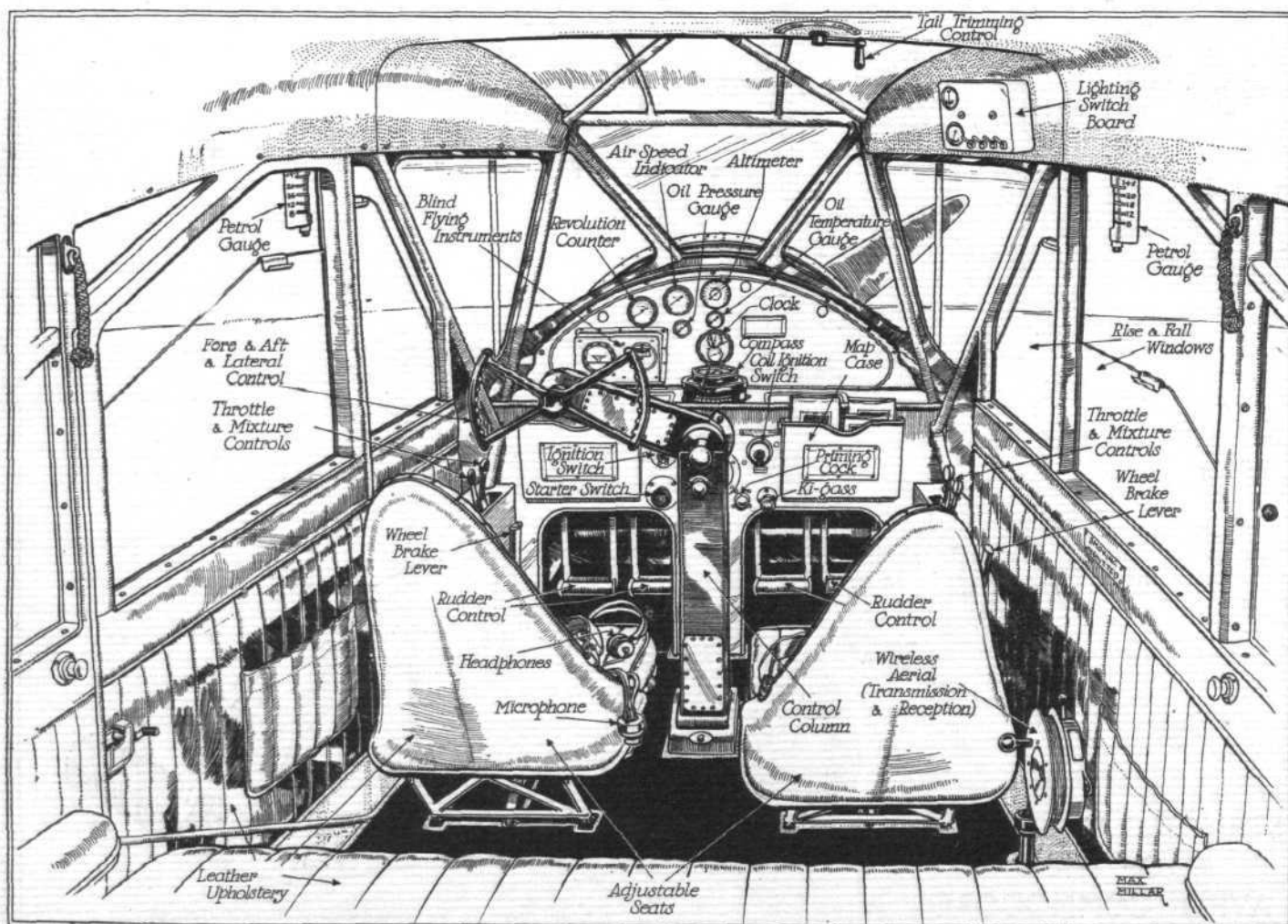


**THE AVRO "COMMODORE" :** The undercarriage is semi-cantilever, and the wing bracing consists of a single lift wire and a single anti-lift strut. (FLIGHT Photo.)

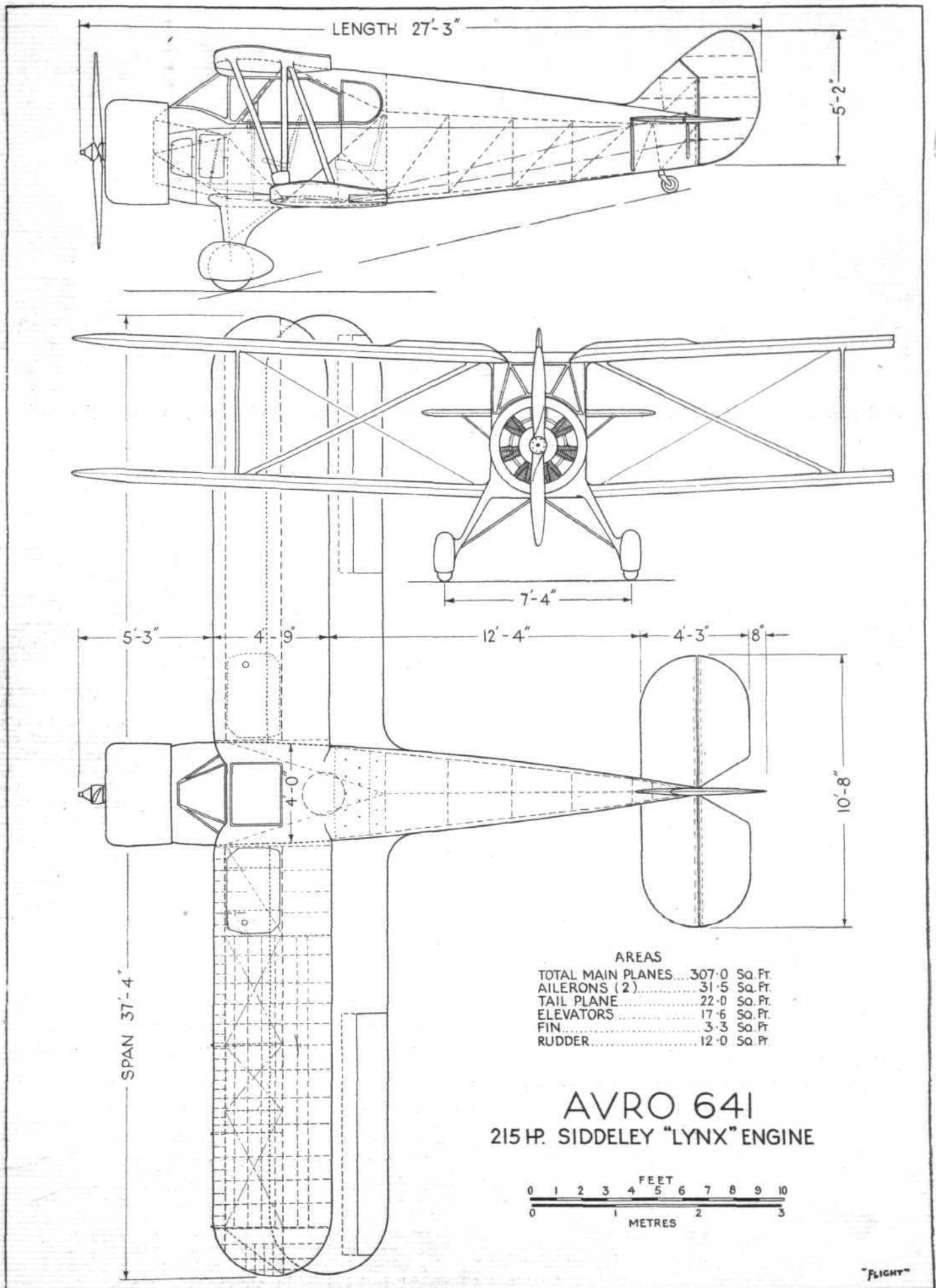
with a 100-h.p. Green four-cylinder water-cooled engine, and was designed for the Military Trials held on Salisbury Plain that year. A sketch of the 1912 machine is given on p. 533. For streamlining that ancient machine was probably at least as good as the modern version, but the view was certainly very restricted, the drop-deck in front of the pilot not having been thought of in those early days. On this machine Lt. Parke got into what was at the time referred to as a spiral dive. Nowadays we know

that he got into a spin, and only extricated himself by accident after trying all sorts of control movements, the nature of the spin being then quite unknown, and the method of getting out of a spin not being discovered until later.

Structurally the Avro "Commodore" follows standard Avro practice, the fuselage having a primary structure composed of welded steel tubes, and the wings having spars formed from corrugated strips, carrying metal ribs. The



**THE CABIN ARRANGEMENT :** Plenty of room everywhere, and a good view in all essential directions are the outstanding features. The instrument board lay-out is unusual.



GENERAL ARRANGEMENT DRAWINGS OF THE AVRO "COMMODORE" : The engine is a 215-b.h.p. Siddeley "Lynx" 7-cylinder air-cooled radial.



THE AVRO "COMMODORE": Ailerons are fitted on the lower wing only, where they are readily accessible for adjustment. (FLIGHT Photo.)

covering of fuselage and wings is doped fabric, and in the case of the fuselage the fabric is supported on longitudinal stringers of wood carried on light wooden formers.

A somewhat unusual bracing arrangement has been adopted for the wings. These are of biplane form and very heavily staggered, so that the rear spar of the top plane is vertically above the front spar of the lower plane. A single "N" strut is fitted in the gap on each side, and the lift and anti-lift wing bracing is in a single plane. In order to reduce maintenance rigging to a minimum the anti-lift member is a streamline steel strut of large dimensions, through the centre of which passes the lift wire. At first sight this very simple arrangement appears incomplete, but actually the wing structure is completely stabilised by the attachments to the fuselage at the inner end, and by the "N" struts at the outer end of the bracing. With biplane wings so heavily staggered it is virtually impossible to arrange for wing folding, and in the Avro "Commodore" no wing-folding arrangement is provided.

### Semi-Cantilever Undercarriage

The undercarriage is of the split type in which the wheels are carried on short stubs on large-diameter telescopic tubes. The telescopic tube and sloping bracing strut are streamlined into a common fairing, and spats are fitted over the wheels. The lateral bracing of the undercarriage is very simple and consists for each leg of a single streamline steel strut running to the centre of the bottom of the fuselage. At its outer end this strut attaches to the outer member of the telescopic leg, so that there is no lateral displacement of this when the wheel moves up and down. The price paid for this absence of lateral movement is the slight overhang, say, 6 or 8 inches, of the lower portion of the telescopic tube, but as this tube is of large diameter, it is well capable of resisting the cantilever loads. The Dunlop wheels are fitted with independently-operated brakes, and in place of the old-fashioned tail skid there is a castoring tail wheel.

The Siddeley "Lynx" engine is completely surrounded by a N.A.C.A. cowling ring, and a single exhaust collector pipe runs under the fuselage to a point near the trailing edge of the lower wing. Petrol is carried in two tanks in the upper plane, one on each side of the fuselage, and each tank has a capacity of approximately 25 gallons. The position of the tanks is, of course, such that direct gravity feed to the engine is available. A Fairey metal airscrew is fitted.

The internal layout of the cabin has been very carefully studied, and the seating arrangement consists of two separate seats side by side in front, from either of which the machine can be piloted. Behind these two seats is a sofa seat running right across the cabin and wide enough at a pinch to seat three passengers, although for real comfort "three is a crowd." Underneath the sofa seat is a large luggage compartment.

### Controls

Controls of normal type are provided, the wheel control for the elevator and ailerons being of the "swing-over" type, so that the machine can be piloted from either the left or the right seat. There is a locking catch which engages when the wheel is fully over to one side or the other, and another catch locks the control column in a fore-and-aft position to prevent the elevator flapping about when the machine is standing on the ground.

Instrument board arrangement has been given very particular attention, and in the Avro "Commodore" the instruments are not only farther away from the pilot than is usually the case, which should cause a great deal less fatigue in watching the instruments, but they are placed on a sloping panel, which also assists in making them very easily readable. The equipment of the cabin is extremely complete, but can be varied according to customers' requirements. The sketch on page 536 shows the cabin arrangement admirably, and was made in the first of the "Commodores" to be completed (a considerable number are on order). The electrical equipment includes a starter, so that the engine can be started by the pilot himself from the cabin.

Large windows in the side of the fuselage and a wind-screen composed of very large triangles afford an excellent view in all essential directions. The top plane does not extend across the cabin, and thus it has been possible to provide a large roof light. Behind this is a circular emergency exit at present covered with fabric. We feel that if a transparent covering were substituted over this exit, it would be a considerable advantage since in that case the occupants of the machine would be able to have a good look upwards and backwards before taking off, so as to ensure that another machine was not about to land at the same time. The cabin is well ventilated and the noise from the engine is not obtrusive, so that it is fairly easy to carry on a conversation during flight.

The machine is equipped with navigation lights for night flying and also carries blind-flying equipment, so that for extended tours, when all sorts of weather may be encountered, the owner of an Avro "Commodore" should be able to continue his flight to his destination.

A petrol capacity is provided sufficient for  $4\frac{1}{2}$  hours at a cruising speed of 110 m.p.h., or a range of approximately 500 miles in still air. With this quantity of petrol and four people on board, there is still available a load of 209 lb. for luggage, etc. If a fifth person is carried the luggage load is reduced to about 50 lb. for full range. The gross weight of the machine is 3,500 lb., and as the tare weight is 2,225 lb., the ratio of gross weight to tare weight is 1.575. In other words, the machine carries 57.5 per cent. of its own weight as disposal load. This is about an average ratio and is actually very much better than appears, because in the tare weight is included the very complete cabin equipment.

# FROM THE CLUBS

*Events and Work at the Clubs and Schools*



**STRAIGHT FROM THE NEST:** A batch of Miles "Hawks" recently supplied by Phillips & Powis Aircraft (Reading), Ltd., to Lord Clive, Messrs. Grover, E. D. Spratt, and H. Singh Uberoi.

## HANWORTH

Three private owners from Hanworth entered for the Doncaster navigation race, and three club machines went "dawn patrolling" to Reading on Sunday, May 20th. Flying time amounted to 54 hours. Among the Empire Day visitors was Sir William Llewellyn, P.R.A.

## HATFIELD

Six new members have joined the London Aeroplane Club, but the event of the week, of course, was Empire Air Day. Imperial Airways' D.H. 86, piloted by Capt. O. P. Jones, arrived with press load in the evening. Flying times were:—London Aeroplane Club, 83 hr. 50 min.; and R.A.F. Flying Club, 19 hr. 35 min.

## MIDLAND

More than a hundred visitors were given flights on Empire Day, so, with that and the normal club work, things were fairly hectic. Mr. George Lowdell gave a very polished exhibition of aerobatics, and both Air Commodore Chamier and Mr. Mollison visited Castle Bromwich. A total of 44 hr. 15 min. flying has been carried out during the week.

## HESTON

The Household Brigade Flying Club have taken delivery of a new de Havilland "Moth Major," which will supersede their "Gipsy I Moth," and the new machine is painted, of course, in the Brigade colours. The special super-finish and the polished metal cowlings give further distinction to this very nice aeroplane. Miss Udaondo, who flies a cabin Waco in the Argentine, and is spending a month in England, is taking a course of blind flying with the Airwork School.

## CARDIFF

Added interest was provided on Empire Day by the presence of the Atlantic Bellanca monoplane. Capt. W. R. Bailey and mechanic had flown over to Aberavon sands to carry out temporary repairs, and Pond and Sabelli had then flown the Bellanca over to Cardiff, whence they departed for Heston on Friday. Mr. F. W. Mathias won the landing competition for Mr. W. G. Nicol's cup.

## SCOTTISH

A good attendance, in spite of the bad to worse weather conditions, at the annual show of the Scottish Flying Club, showed that enthusiasm is not lacking in that part of the world. In the programme were included a display by 602 City of Glasgow (Bomber) Squadron and their "Harts," an aerobatic display by Capt. A. N. Kingwill, one of the masters of Avro flying, an inevitable parachute descent by Mr. Fairlie, and aerial drill by three "Mongoose" Avros.

The May number of *The Scottish Flyer* is bright as ever, though the flying statistics for April make depressing reading; out of the thirty days only one had really good weather and seven had fair weather. Hence the shortage of new "A" licences, in spite of the fact that there are more than fifty pupils in training and six machines.

## BROOKLANDS

Flying time has again increased to 90 hr. 30 min. under the prevailing good weather conditions, and the week's new members include Lord Cardigan. Only one out of eight machines from Brooklands got through to Reading and a free breakfast on the 13th. Large crowds arrived on Empire Air Day.

## CINQUE PORTS

Four new members have joined and 31 hours' flying were covered during last week at Lympne. Several members went over to Eelde, in Holland, for the Whitsun meeting, and it is hoped that a return visit may be made later in the summer. One machine has just returned from its "C. of A." complete with night-flying equipment, and new offices are to be built for the staff.

## SOUTHERN

The Air Display at Shoreham last Sunday went off well and included such useful events as a Fly Past, in which a brief description of each machine was given through the loud speakers, a special demonstration of a Miles "Hawk," an exhibition of auto-towed gliding, and a "dead-stick" landing, in addition to the usual balloon burstings, aerobatics, crazy flying, and a parachute descent by John Trantum. Curiously enough, two people tied in the public height-judging competition!

## HERTS AND ESSEX

Four "Moths" are now in use at Broxbourne, and an order has been placed for a Miles "Hawk," for which delivery is expected shortly. The official opening of the new clubhouse extensions will be celebrated on Thursday, June 7th, by a supper-dance and entertainment, commencing at 7.30 p.m. F/O. W. B. Wilson has been engaged during the temporary absence of the Chief Instructor, and a total of 168 hours has been flown during the past fortnight. Incidentally, the name of the aerodrome is to be painted in white on the roof of the enlarged clubhouse.

## NORFOLK AND NORWICH

The Public Schools Aviation Camp arrangements are now going ahead, and this will be held during August. A £30 fee for each boy will include training for licence as well as four or five weeks under canvas, and Mr. H. Birchall, who originated the idea, will be in charge of the organisation. Entries, for boys of 17 years and over, can be received until early June.

On Empire Air Day some three thousand children and grown-ups arrived at Mousehold, and forty free flights, distributed by the local cinemas, were given, apart from normal "joyrides." Mr. J. Collier gave a display in the evening and Mr. A. J. S. Morris one in the afternoon. Visiting pilots during the week included Mr. Ken Waller (of Australia-England fame) from Lympne.

Next week the preliminary heats of the "Married versus Single" competition will be flown off.

## EGYPT

Plans have now been completed for the erection of a small modern clubhouse at Dekheila Aerodrome for the use of pupils of the Misr Airwork School and of flying visitors to Alexandria. This should be open during next month. At Cairo, 78 hours were flown during the fortnight ending on May 14th, and on the 9th over a hundred members of the Y.M.C.A. visited the aerodrome.

## BOMBAY

The annual display of the Bombay Flying Club was held on April 22nd, and for the first time ten machines were lined up on the aerodrome in the presence of a distinguished gathering, including Lord and Lady Brabourne. A programme of fourteen items was run through according to schedule. Flying time during April totalled 217 hours, including a number of cross-country trips.

# THE FIRST EMPIRE AIR DAY

*Thousands Visit Service and Civil Aerodromes all over the Country*



AT BIRCHAM NEWTON: The King and Queen on the aerodrome during a tour of inspection. Lord Londonderry, Sir Philip Sassoon, Air Marshal Sir Robert Brooke-Popham, and Wing Commander R. Collishaw (Commanding Officer at Bircham Newton) may also be seen.

THE King and Queen, visiting a Service aerodrome for the first time since the War, were among the hundred thousand or so who took the opportunity of seeing the R.A.F. at home on Empire Day. Thousands more must have crowded to the various civil aerodromes.

Notwithstanding the initial intention that the public should see aviation, so to speak, on a normal working day, at most of the aerodromes great efforts were made to give them special displays and demonstrations. Under perfect weather conditions the public saw, in fact, the best of everything, and should have learnt a great deal.

What is even more important, representatives of the daily press were taken for a tour of England in one of the

latest Imperial Airways' machines, the D.H.86—or better known probably as the "Double Dragon"—with four "Gipsy Sixes," which will be used on the last section of the Australian service. This machine was piloted by Capt. O. P. Jones. Another tour was made by the Vacuum Oil Co.'s "Dragon," conveying greetings from the Air League to the various aerodromes. The machine was piloted by Mr. R. H. Stocken, and Mr. Lawrence Wingfield, of the G.A.P.A.N., was one of the passengers.

Both the Prince of Wales and the Prime Minister sent messages to the Air League, and Air Marshal Sir Robert Brooke-Popham has received a message from the King expressing his warm appreciation of the manner in which the programme at Bircham Newton was carried out.

## PARIS TO NEW YORK

*The Veteran Bleriot "Joseph le Brix" adds an East to West Atlantic Crossing to its Previous Successes*

INTENDING to fly non-stop from Paris to San Diego, California, Paul Codos and Maurice Rossi landed at Floyd Bennett Field, New York, on Monday afternoon. They were delayed by dense fogs near Newfoundland, and suffered, in addition, slight engine trouble during their flight.

Actually, this is only the second direct flight from Paris to New York, the first being made by their fellow-countrymen, Costes and Bellonte, in a Breguet XIX (*Question Mark*), during September, 1930. Wireless messages were received during the flight, though for some hours there

was no precise news, and anxiety was being felt when a report was sent in from the commander of the American fleet stating that he had received a message.

The machine, *Joseph le Brix*, a Blériot-Zappatta 110 monoplane (Hispano-Suiza), which had originally been designed for long-distance record breaking, has had a markedly successful history. Last year, with the same crew, it established a new long-distance record by flying from New York to Rayak, Syria, and previously it had established world's records over closed circuits, beating our own record by a handsome margin.

# The AIRCRAFT ENGINEER

## "FLIGHT" ENGINEERING SECTION

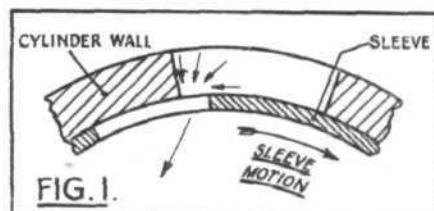
Edited by C. M. POULSEN

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May 31, 1934

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SINGLE-SLEEVE-VALVE ENGINE: Diagram showing oblique inflow during early part of induction stroke.

## THE EFFECT OF SWIRL ON PETROL ENGINE COMBUSTION

By J. F. ALCOCK\*

"SWIRL," or rotation of the charge within the combustion chamber, is known to have a profound effect on combustion in Diesel engines, but its effect on petrol engines has not received much attention. The reason for this is that in the Diesel it is a valuable asset, easing as it does the critical problem of fuel distribution, while in the petrol engine it is generally a nuisance.

Until recently petrol engine swirl has been of no great importance, for in most engines of normal design the amount of swirl, if any, is so small that its effect is negligible. There are, however, a few known exceptions to this rule, and perhaps a fair number of unsuspected cases.

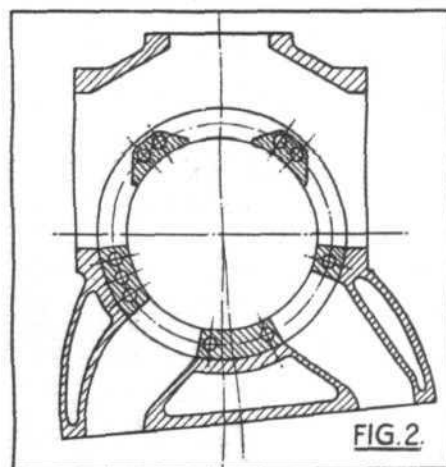
Recently, however, the single sleeve valve engine has entered the aircraft field, and in this type of engine swirl is of far greater importance. As will be seen later, the method of inlet port control in these engines automatically produces a high rate of swirl, and painful experience soon showed that it was a factor to be reckoned with.

### Method of Swirl Production

In the single-sleeve engine the inlet ports are opened by the circumferential motion of the sleeve and closed by its upward motion. During the early opening period the orifice is faired on one side only by the edge of the cylinder port, and the mixture therefore enters obliquely, causing the charge to rotate in a direction opposite to that in which the sleeve is moving. Fig. 1 illustrates this effect.

In the later part of the suction stroke the sleeve is moving vertically and no swirl is produced by the port

itself. At this time, however, the flow in the port approaches may be utilised to increase or reduce the "natural" swirl previously produced by the port. Thus, in Fig. 2, which shows a section through the ports of the engine used for the tests described herein, the sleeve is moving anti-clockwise when the inlet ports open, and the natural swirl is therefore clockwise. If

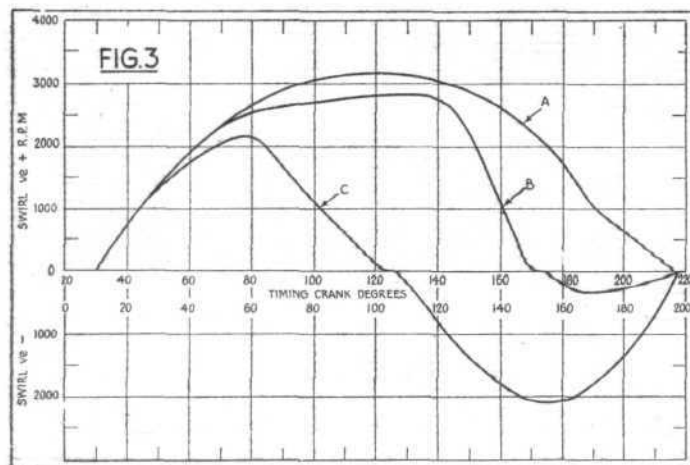


EXPERIMENTAL SINGLE-SLEEVE-VALVE ENGINE: Section through Ports.

the mixture is admitted to the belt by the left-hand inlet, the flow in the belt is clockwise and reinforces the natural swirl, but if the right-hand inlet is used, the total swirl is decreased. These effects are clearly shown in Fig. 3, which shows the results of a "blowing" test on the above engine. In this type of test the engine is stationary, and air is blown through the inlet ports (the cylinder head being removed) and the rate of swirl is measured by a freely rotating vane within the cylinder. The test shows that the flow in

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# THE AIRCRAFT ENGINEER

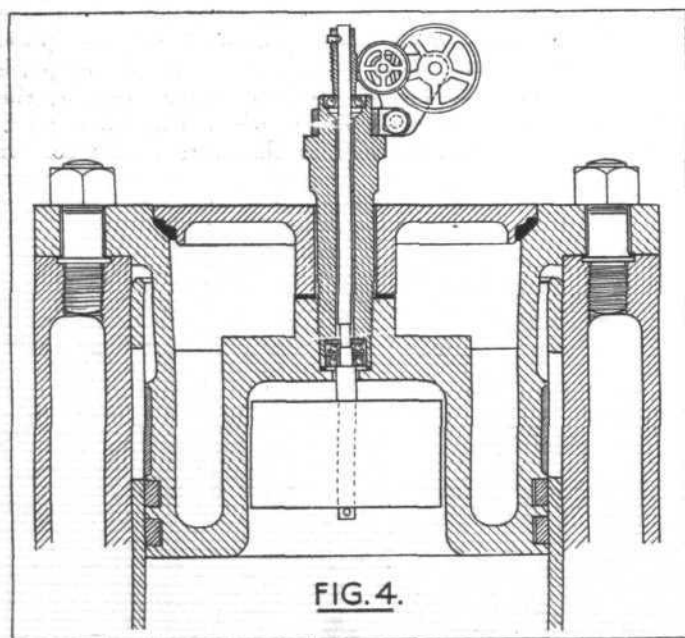


**BLOWING SWIRL TEST. ENGINE STATIONARY:** Air Pressure 10.0 in. of Water. Curve A, air to Inlet Belt from Intake P (pro-swirl). Curve B, air to Inlet Belt from Intake N (neutral). Curve C, air to Inlet Belt from Intake A (anti-swirl). See Fig. 6.

the inlet belt affects the swirl mainly during the later part of the suction stroke, and has no influence at all at the beginning of the opening period, owing to the low velocity of the air in the belt at that time.

## Swirl Measurement

"Blowing" tests such as those just described are aids to the understanding of the mechanism of swirl production, but give no measure even relatively of the rate of swirl when the engine is running. To obtain this a "swirl meter" is employed, consisting of a freely rotating vane in the combustion chamber, with a spindle



**Swirl Meter for Motoring Swirl Tests.**

passing through the head to external counting mechanism. Fig. 4 shows such a swirl meter (fitted to a Diesel combustion chamber). The engine is then motored, and the vane speed observed. Such a test is called a "motoring swirl" test. It does not, of course, give the actual rate of swirl during the combustion period, which is the swirl that matters, but appears to be consistently related thereto.

## Swirl Notation

As will be shown later, the swirl r.p.m., as measured by a motoring swirl test, which is required by any

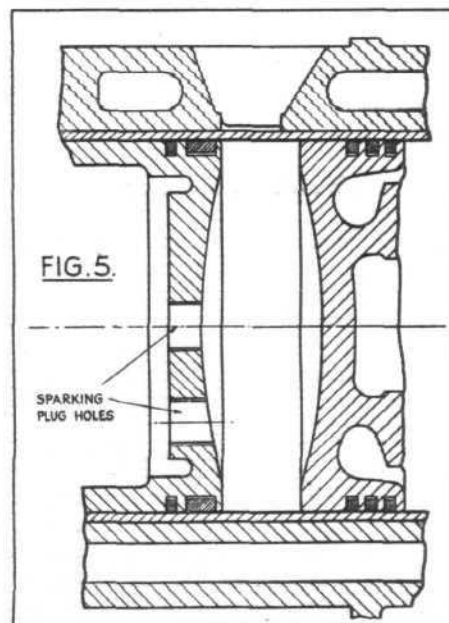
given engine if it is to give its best results, is proportional to the engine speed. Thus the most logical measure of the swirl intensity is the "swirl ratio" or ratio of swirl r.p.m. to engine r.p.m. Thus a swirl meter speed of 2,000 r.p.m. at an engine speed of 1,000 r.p.m. is expressed as a "swirl ratio" of 2. In what follows this notation is used throughout.

## EXPERIMENTAL WORK

The work to be described was performed on an experimental single sleeve valve engine with one water-cooled cylinder of 5.5-in. bore and 7-in. stroke, with a normal running speed of 1,300 r.p.m. There are three inlet and two exhaust ports, giving nominal gas velocities at 1,000 r.p.m. of 125 ft./sec. for the inlet and 169 ft./sec. for the exhaust. The port timing is:—

I.O. 10° L.	E.O. 52.5° E.
I.C. 22° L.	E.C. 22° L.

The inlet ports are connected by a belt, shown in Fig. 2, which has three intakes. By fitting the carburetter on one or other of these intakes, the normal charge swirl caused by the asymmetrical port opening can be increased or decreased by varying the tangential flow in the belt, and the swirl ratio thus varied over a considerable range. This range can be extended on either side by the use of pro-swirl or anti-swirl baffles on the outside of the ports.



**EXPERIMENTAL SINGLE-SLEEVE-VALVE ENGINE: Section through Combustion Chamber.**

The combustion chamber is of the lenticular form shown in Fig. 5, giving a compression ratio of 5.88. There are two alternative sparking plug positions, one central and the other offset by  $1\frac{1}{8}$  in. (0.261 of the sleeve bore).

The carburetter is a Claudel-Hobson type, 62-mm. body, 48-mm. choke, with variable main jet. Ignition was by coil to a single plug.

## Test Equipment, etc.

The engine output was measured by a swinging-field electrical dynamometer, the r.p.m. by a tachometer which was frequently checked against a counter, and fuel consumption by calibrated measure and stop-watch. The indicator diagrams were taken with a "Farnboro" indicator.

# THE AIRCRAFT ENGINEER

Water flow in the jacket-heat tests was measured by weight, and water temperatures by the usual mercury thermometers. In these jacket-heat tests no allowance

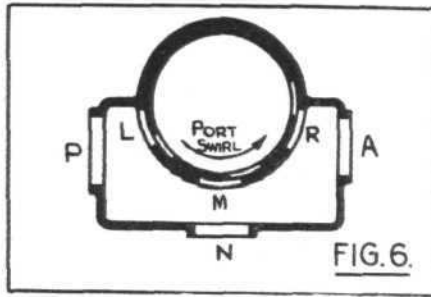


Diagram of Inlet Manifold and Ports.

is made for convection heat losses from the engine, etc.; this is obviously independent of the swirl rate, and thus will not affect the differences due to swirl variation.

## Details of Tests. Swirl Calibration

Motoring swirl tests were made over the speed range with eight intake conditions, as follows:—

Table 1

Table of Intake Arrangements and Swirl Ratios at 1,300 r.p.m.  
(see Fig. 6)

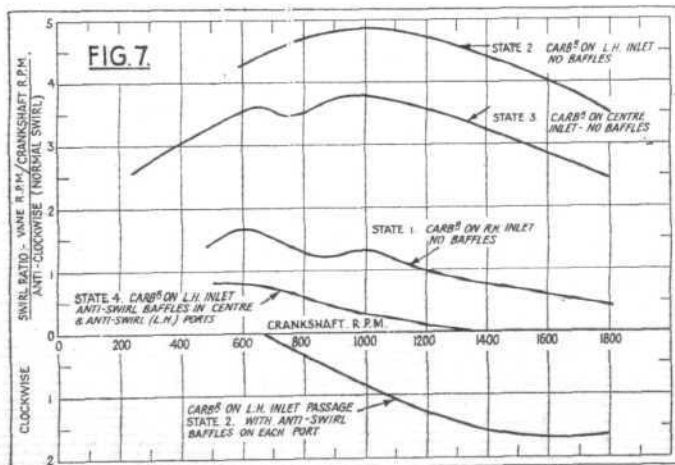
State	Carburettor on Intake	Port Baffles in ports (see Fig. 5)			Swirl ratio N/n at 1,300 r.p.m.
		L	M	R	
1	A (anti-swirl)	—	—	—	0.85
2	P (pro-swirl)	—	—	—	4.6
3	N (neutral)	—	—	—	3.35
4	P	A-S	A-S	—	0
5	N	P-S	—	P-S	5.6
6	P	A-S	A-S	A-S	1.5 (reverse swirl)
7	N	—	A-S	—	—
8	N	P-S	P-S	P-S	6.8

A-S Anti-swirl baffle. P-S Pro-swirl baffle.

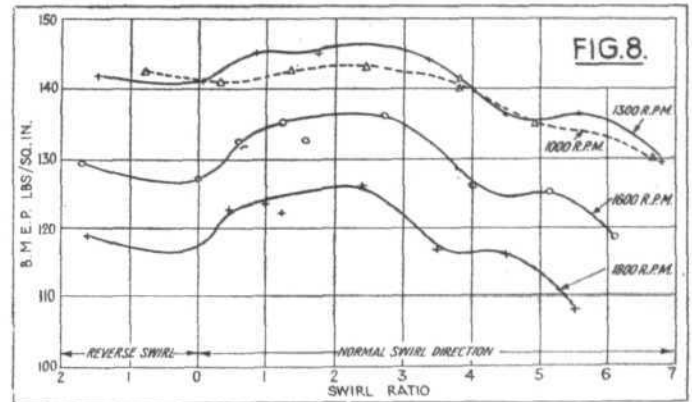
For swirl rates of above states over the speed range, see Fig. 7.

## Engine Performance

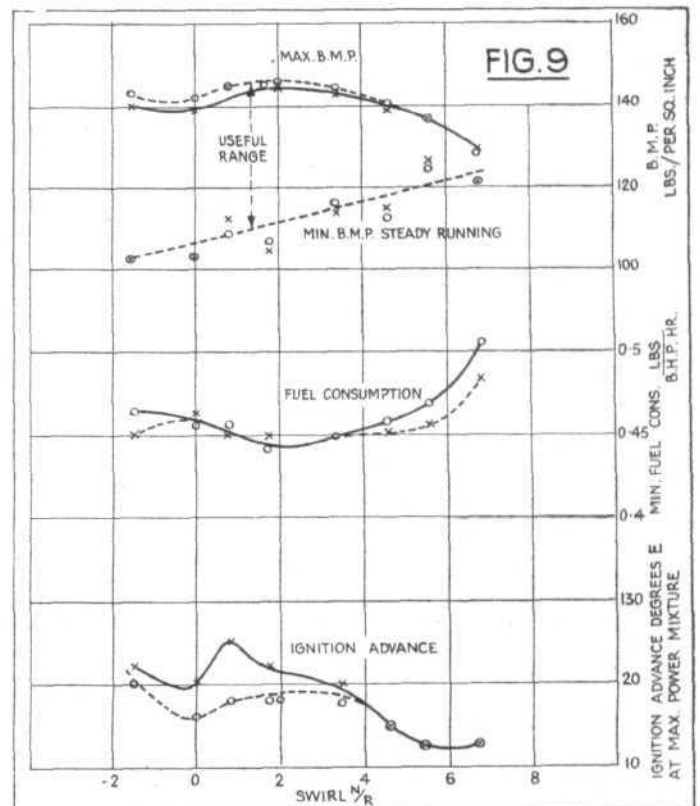
Measurements were made at a number of swirl rates, of the following quantities:—



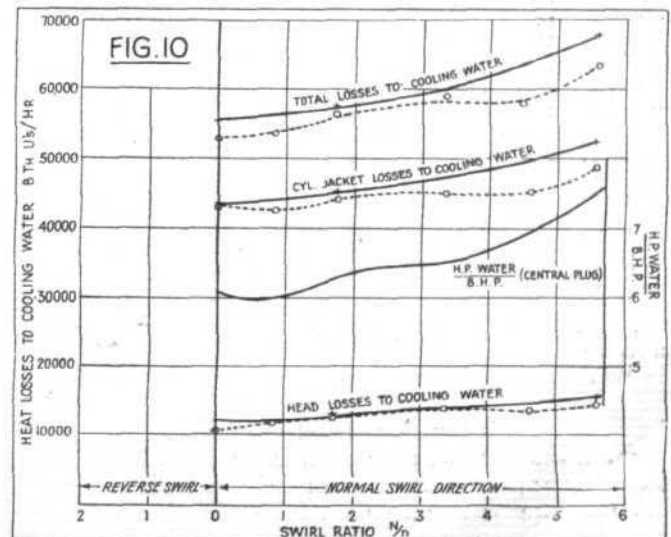
MOTING SWIRL TESTS: Effect of Engine Speed on Swirl Ratio.



EFFECT OF SWIRL ON POWER OUTPUT AT VARIOUS SPEEDS: Central Sparking Plug.



EFFECT OF SWIRL ON FUEL CONSUMPTION (MINIMUM), AVAILABLE MIXTURE STRENGTH RANGE AND IGNITION ADVANCE REQUIREMENT: Full lines refer to central sparking plug and 1,300 r.p.m. Dotted lines refer to offset sparking plug.

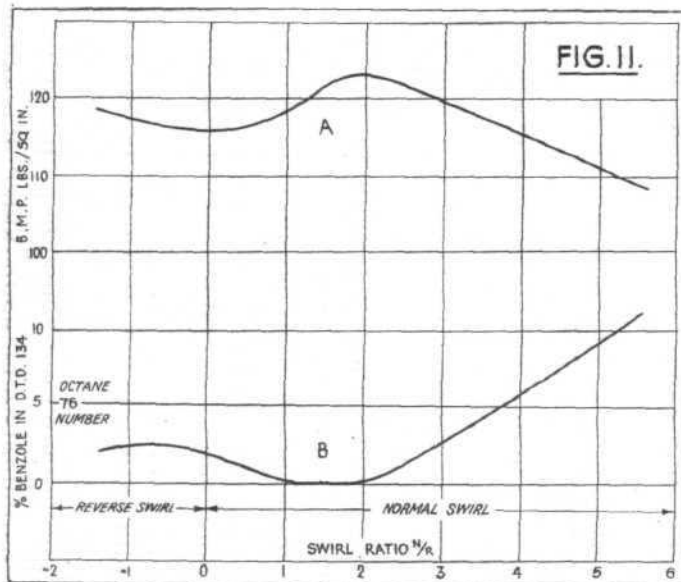


EFFECT OF SWIRL ON HEAT TO COOLING WATER: 1,300 r.p.m., constant total fuel consumption (17 pts. per hr.). Full lines refer to central sparking plug, dotted lines to offset plug.

# THE AIRCRAFT ENGINEER

- (A) B.M.P. at various speeds.
- (B) Minimum fuel consumption and available mixture range at 1,300 r.p.m.
- (c) Heat to cylinder and head water jackets at 1,300 r.p.m.
- (D) Detonation tendency at 1,300 r.p.m.
- (E) Maximum cylinder pressure and rate of combustion pressure rise (1,300 r.p.m.).

Except in the detonation tests, a non-detonating fuel was used throughout.



**EFFECT OF SWIRL ON DETONATION: 1,300 r.p.m., central sparking plug.** The letters F.S.-O.M. indicate "frequent, slight, occasional, moderate detonation."

The results of these tests are shown in Figs. 8, 9, 10, 11 and 12 respectively, while the figures obtained at 1,300 r.p.m. are summarised in the following table:—

**Table 2.**

Figures obtained at 1,300 r.p.m.

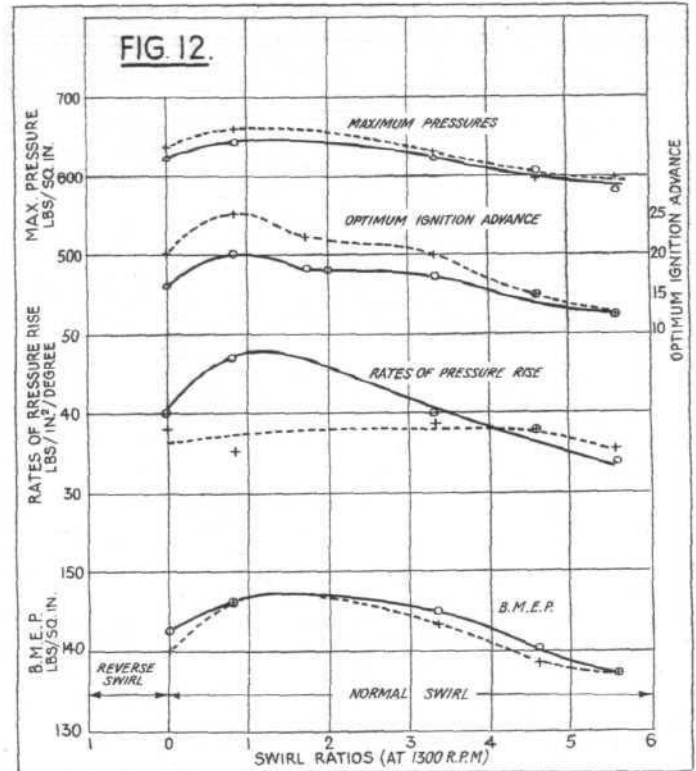
Swirl N/n at 1,300 r.p.m.	State	Max. M.E.P. lb./in. <sup>2</sup> Brake Ind.	M.E.P. range lb./in. <sup>2</sup> (approx.)	Min. cons. pts./b.h.p./hr.	Optm. Ign. Adv. deg. E.	H.P. in water b.h.p.	Octane number of fuel giving standard detn.	Rate pressure rise lb./in. <sup>2</sup> per deg.	Peak cyl. press. lb./in. <sup>2</sup>
<b>Central Plug</b>									
-1.5	6	143	159	40	0.465	20	75.7	—	—
0	4	141.2	157.2	37	0.456	16	75.7	40	620
0.85	1	144.8	160.8	36	0.456	18	75.7	47	640
1.75	7	144.5	160.5	37	0.444	18	75.5	—	—
3.35	3	144	160	29	0.450	17.5	75.9	40	615
4.6	2	140	156	28	0.458	15	75.9	38	605
5.6	5	137	153	13	0.470	12.5	76.5	34	585
6.8	8	129	145	8	0.500	12.5	—	—	—
<b>Offset Plug</b>									
-1.5	6A	140	156	37	0.450	22	—	—	—
0	4A	139	155	34	0.464	20	0.63	38	635
0.85	1A	144.8	160.8	32	0.450	25	0.625	35	660
1.75	7A	145.5	161.5	41	0.450	22	0.635	—	—
3.35	3A	143	159	29	0.450	20	0.66	39	630
4.6	2A	139	155	24	0.452	15	0.76	37.5	600
5.6	5A	137	153	10	0.455	12.5	0.805	35.5	600
6.8	8A	129	145	9	0.485	12.5	—	—	—

All readings (except fuel consumption) at maximum power mixture strength.

\* For maximum power mixture strength.

## Detonation Tests. Series D.

These were of two kinds. In the first series the engine was run throttled on a fuel of relatively low octane number and the throttle opened to give a standard intensity of detonation. This was done with various swirl conditions and the B.M.P. giving standard detonation taken as an (inverse) index to the detonation tendency. These B.M.P. figures are shown in the upper curve of Fig. 11.



**EFFECT OF SWIRL ON MAXIMUM CYLINDER PRESSURE AND RATE OF PRESSURE RISE: 1,300 r.p.m. Max. power mixture strength.** Full line refers to central sparking plug, dotted line to offset plug.

In the second series of tests the engine was run at 1,300 r.p.m., full throttle, and benzole added to the petrol (D.T.D. 134) to reduce the detonation to standard intensity. The "octane number" of this mixture was then measured in a C.F.R. engine by the "Aircraft Method" (900 r.p.m., shrouded inlet valve, mixture temperature 260 deg. F.). This process was repeated for various swirl rates, giving the results shown in the lower curve of Fig. 11.

## COMMENTS ON TEST RESULTS

**Series A. B.M.P./Swirl (Fig. 8).**—The highest output is given, at all speeds, by a swirl ratio (swirl-meter speed/engine speed) of about 2.2.5. The curves are fairly flat, on the low-swirl side of the maximum, giving an available swirl range, without serious loss of performance, of 0.5-3.5.

The motoring M.E.P. was found to be independent of swirl, at any rate within the limits of engine variation ( $\pm 1.0$  F.M.P.) so that the above conclusions apply to I.M.P. as well as B.M.P.

**Series B. Fuel Consumption and Mixture Range at 1,300 r.p.m. (Fig. 9).**—In these respects also a swirl ratio of about 2.0 gives the best results. There is little difference between the central and offset plug positions, except that the latter appears to mitigate the increase in consumption due to excessive swirl. Why this improvement should exist is not clear, especially as the mixture range and the ignition advance requirements at these high swirls are the same as with the central plug.

In all these mixture range tests the ignition advance was adjusted to suit each mixture strength.

The ignition advance requirements decrease steadily with increasing swirl.

**Series C. Jacket Losses at 1,300 r.p.m. (Fig. 10).**—The minimum gross loss is at zero swirl, but the minimum loss per b.h.p. is at a swirl ratio of 1, that at the optimum power swirl ratio of 2 being some 6 per cent. higher. Incidentally, the ratio h.p. in water/b.h.p. is very low, being only 0.6 at a swirl ratio of 1.

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The jacket losses are increased by offsetting the plug, but in the optimum swirl region the difference is negligible.

The head losses are about 25 per cent. of the cylinder losses and vary with swirl in the same manner. This ratio does not, however, necessarily represent the proportion in which the head and cylinder receive heat from the gases, for experience indicates that there is a good heat-flow path from head to cylinder via the head-rings and sleeve.

*Series D. Detonation Tests at 1,300 r.p.m. (Fig. 11).*—As stated above, tests were made by two methods, the first that of throttling, and the second that of fuel mixtures. Both methods show minimum detonation with a swirl of 1.5-2.0, or practically the same value as the optimum for power and efficiency. The total range of requirements in fuel quality is, however, not great,

the extreme difference being only one "octane number." Incidentally, it appears that this engine is very sensitive to the fuel quality as far as audible detonation is concerned, a difference of 0.1 octane number being distinguishable by ear, but, on the other hand, it does not suffer seriously from the secondary effects which normally render detonation dangerous. Thus the jacket heat loss is not appreciably increased by detonation, and there is no tendency to pre-ignition with any reasonable degree of detonation. These characteristics were, incidentally, also shown by a similar air-cooled sleeve-valve unit, which could run continuously with a really alarming intensity of detonation. The path of the detonation noise is affected by the swirl varying from the usual "pink" at low swirl ratios to a dull thud with high swirl.

(To be concluded)

## INVESTIGATION INTO THE VARIATION OF ENGINE POWER WITH HEIGHT

By W. R. ANDREWS, A.F.R.Ae.S.\*

(Concluded from p. 31)

A similar treatment is given to the alternative form of the power law of equation 10, when  $f_1 = 0.0674$ , so that

$$p_e = 1.0674 P (1.5 - 0.5 T) - 0.0674 \quad (14)$$

Tables 4 and 5 give the characteristics and calculation of  $N\sqrt{\sigma}$  corresponding to Tables 2 and 3. The plotted value corresponding to Fig. 3 are given in Fig. 4.

It is at once apparent from Table 5 that the correction for temperature quickly increases with height, and does not

\* Mr. Andrews is on the Technical Staff of A. V. Roe & Co., Ltd.

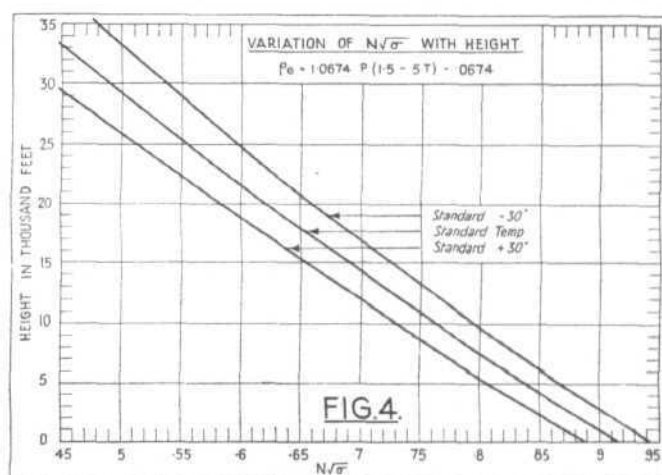


TABLE 4

$$p_e = 1.0674 P (1.5 - 0.5 T) - 0.0674$$

Height H feet	$\sigma$	$\rho$	$\frac{\sigma}{p_e}$	$P/n^3$	$\sqrt{\sigma}$	$N\sqrt{\sigma}$	Equivalent Standard Height $H_E$	$H_E - H_S$ $= \Delta H$
Standard Temperature								
0 ...	1.0	1.0	1.0	1.219	1.0	0.915	—	—
5,000 ...	0.8616	0.836	1.031	1.257	0.9282	0.838	—	—
10,000 ...	0.7384	0.6921	1.067	1.301	0.8593	0.763	—	—
15,000 ...	0.6291	0.566	1.111	1.355	0.7932	0.6913	—	—
20,000 ...	0.5327	0.4567	1.167	1.423	0.7298	0.622	—	—
25,000 ...	0.4480	0.3625	1.236	1.507	0.6693	0.5555	—	—
30,000 ...	0.374	0.2821	1.325	1.615	0.6115	0.4920	—	—
Standard Temperature + 30°								
0 ...	0.9055	0.9444	0.959	1.169	0.9516	0.887	1,800	1,800
5,000 ...	0.7775	0.7804	0.996	1.214	0.8818	0.8075	7,050	2,050
10,000 ...	0.6640	0.6365	1.0435	1.272	0.8149	0.731	12,250	2,250
15,000 ...	0.5635	0.5104	1.104	1.347	0.7507	0.656	17,650	2,650
20,000 ...	0.4754	0.4011	1.1855	1.445	0.6895	0.5835	22,900	2,900
25,000 ...	0.3980	0.3065	1.299	1.585	0.6311	0.512	28,400	3,400
30,000 ...	0.3306	0.2265	1.460	1.780	0.5750	0.442	34,000	4,000
Standard Temperature - 30°								
0 ...	1.116	1.0556	1.056	1.288	1.0565	0.943	—	—
5,000 ...	0.9655	0.8916	1.083	1.321	0.9876	0.866	3,100	1,900
10,000 ...	0.8315	0.7477	1.1125	1.357	0.9129	0.7955	7,850	2,150
15,000 ...	0.712	0.6216	1.146	1.397	0.8438	0.7255	12,600	2,400
20,000 ...	0.606	0.5123	1.183	1.4425	0.7785	0.6595	17,400	2,600
25,000 ...	0.5125	0.4181	1.226	1.495	0.7159	0.5965	21,950	3,050
30,000 ...	0.4305	0.3377	1.275	1.555	0.6561	0.537	26,500	3,500

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TABLE 5

$$\rho_e = 1.126 \frac{P}{\sqrt{T}} - 0.126$$

Height H. feet	$\sqrt{\sigma}$	$\rho_e$	$\frac{\sigma}{\rho_e}$	$P/\eta^3$	$N \sqrt{\sigma}$	Equivalent Standard Height $H_E$	$H_E - H_s$
Standard Temperature							
0 ...	1.0	1.0	1.0	1.219	0.915	—	—
5,000 ...	0.9282	0.8272	1.042	1.271	0.833	—	—
10,000 ...	0.8593	0.6759	1.092	1.332	0.755	—	—
15,000 ...	0.7932	0.5445	1.156	1.410	0.6785	—	—
20,000 ...	0.7298	0.4308	1.237	1.509	0.605	—	—
25,000 ...	0.6693	0.3325	1.347	1.643	0.534	—	—
30,000 ...	0.6115	0.2488	1.503	1.833	0.4635	—	—
Standard Temperature + 30°							
0 ...	0.9516	0.9448	0.959	1.170	0.887	1,800	1,800
5,000 ...	0.8818	0.7793	0.998	1.218	0.8065	6,800	1,800
10,000 ...	0.8149	0.6346	1.047	1.276	0.730	11,700	1,700
15,000 ...	0.7507	0.5091	1.107	1.350	0.6555	16,600	1,600
20,000 ...	0.6895	0.4000	1.188	1.449	0.583	21,450	1,450
25,000 ...	0.6311	0.3064	1.299	1.584	0.512	26,450	1,450
30,000 ...	0.5750	0.2264	1.460	1.780	0.442	31,400	1,400
Standard Temperature - 30°							
0 ...	1.0565	1.0642	1.048	1.278	0.946	—	—
5,000 ...	0.9826	0.8829	1.093	1.333	0.863	3,200	— 1,800
10,000 ...	0.9129	0.7253	1.147	1.399	0.784	8,200	— 1,800
15,000 ...	0.8438	0.5873	1.212	1.478	0.707	13,200	— 1,800
20,000 ...	0.7785	0.4674	1.297	1.582	0.632	18,100	— 1,900
25,000 ...	0.7159	0.3645	1.407	1.714	0.5595	23,100	— 1,900
30,000 ...	0.6561	0.2762	1.559	1.901	0.489	28,100	— 1,900

TABLE 6

Column	...	...	...	1	2	3	4
$\rho_e$	=			$P^{1.05}$	$P^{1.15} T^{-0.5}$	$1.126 \frac{P}{\sqrt{T}} - 0.126$	$1.0731 \frac{P}{\sqrt{T}} - 0.0731$
Height	P	T	—	—	—	—	—
feet							
40,000	0.1852	0.7569	0.1702	0.1564	0.1136	0.1552	
50,000	0.1149	0.7569	0.1032	0.0955	0.0227	0.0677	
60,000	0.07125	0.7569	0.0624	0.0551	— 0.034	0.0148	

seem at all in agreement with the results of flight test data. The most noticeable thing is that the ground level correction is practically the same for both the methods.

The conclusion drawn from this part of the investigation is that the most satisfactory power law is of the form

$$\rho_e = 1.0731 \frac{P}{\sqrt{T}} - 0.0731 \dots \dots \dots (15)$$

which gives as close an agreement with test results as can be expected and also agrees well with the power factors determined from flight trials.

Any modification to cover the variation of the power factor with r.p.m. must be a complication which is unjustified since the observed bases of reduction vary from  $p$  to  $p^{0.2} \sigma^{0.8}$

for  $N \sqrt{\sigma}$  and from  $p$  to  $\sigma$  for  $V_e \sqrt{\sigma}$  and the mean represented by the power law given above.

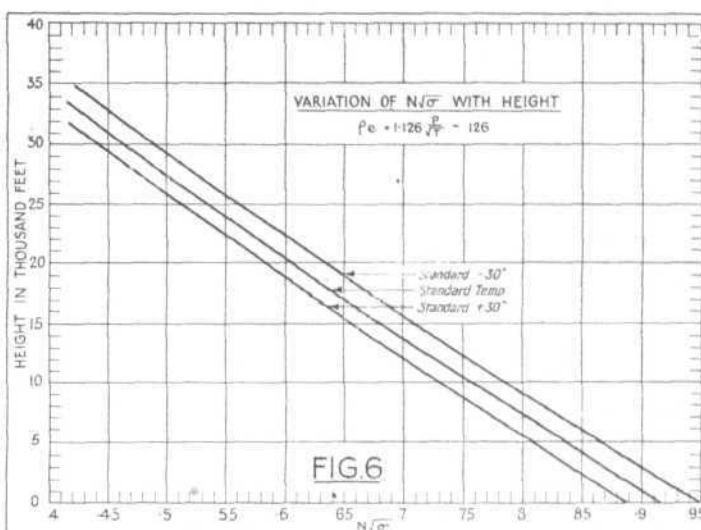
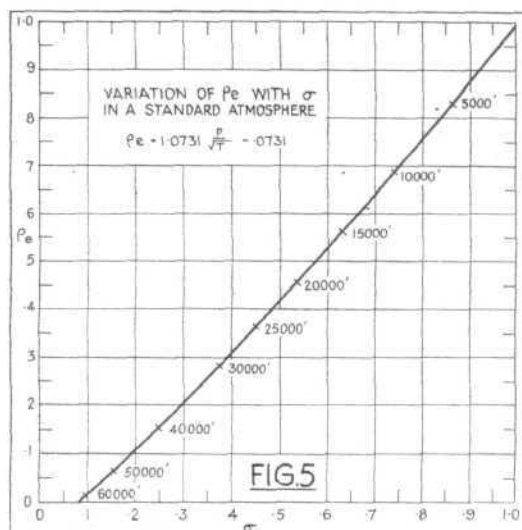
In R. & M. 1532, it was stated that to obtain the power factor it was assumed that  $\rho_e$  had a linear variation with density.

There is no indication given as to whether there is a systematic variation from this linear relationship, so that no comparison can be made. Fig. 5 gives the values of  $\rho_e$  (as determined by (15)) against  $\sigma$ .

For values up to 25,000 ft., a straight line can be drawn which is well within 1 per cent. of the calculated values.

Without a knowledge of the way in which the departure from the linear occurs in R. & M. 1532, it is impossible to

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draw any conclusions from this curve, except that in so far as  $\rho_e$  is almost a linear function of  $\sigma$  it agrees with the tests upon which R. & M. 1532 are based.

There is some evidence to show that the variation of power with height varies according to the relationship.

$$\rho_e = P^{1.05}$$

which as pointed out previously agrees closely with Diehl's power factor

$$\rho_e = P^{1.15} \sigma^{-0.5}$$

In order to investigate the effect of this smaller power factor a value of  $f$  in equation (10) was chosen to agree with these power factors at about 12,500 ft. The new power factor takes the form

$$\rho_e = 1.126 \frac{P}{\sqrt{T}} - 0.126 \quad (16)$$

The values of  $N\sqrt{\sigma}$  have been calculated for this case. See Table 5 and Fig. 6.

The values of  $\Delta H$  show definite differences of  $+30^\circ$  as compared with  $-30^\circ$  from standard. The former shows a definite drop off with height while for the latter  $\Delta H$  is almost constant for any height.

The average value of  $\Delta H$  is 57 ft. per  $1^\circ C.$ , which is roughly the same as that found for  $\rho_e = 1.0731 P/\sqrt{T} - 0.0731$ .

It is concluded that the basis of reduction is dependent only upon the form of the power law and not upon the numerical value of the constants.

The best form of the power law seems to be of that given in equation (10) with  $f = 0.0731$ .

Table 6 on p. 38 has been compiled to show the effect of extrapolation into the Isothermal atmosphere of all the forms discussed.

It is noticed that the power factor in columns 3 and 4 (of the form of equation (10) is much below that given by columns 1 and 2 which assume a power output down to zero pressure. In fact, column 3 (equation (16)) shows that at 53,800 ft. a normally aspirated engine will not supply any external power. With column 4 (equation (15)), the height at which the power output is zero is some 10,000 ft. higher.

Over the range of heights likely to be covered by unsupercharged engines the power factor of equation (15) ( $f = 0.0731$ ) seems to be the most justifiable.

Obviously the question of the power factor for supercharged engines requires separate treatment, as that determined for unsupercharged units suggests that flight is impossible above 60,000 ft. for any engine.

It is also conceivable that the form of the power factor will vary with compression ratio, but these questions must be left until further data are available

## TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH  
COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller.

ON THE EFFECTS OF VISCOUS AND SOLID FRICTION IN AIRSCREW DRIVES IN DAMPING TORSIONAL VIBRATION. By B. C. Carter, F.R.Ae.S., M.I.Mech.E. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1557. (25 pages and 6 diagrams.) February, 1931. Price 1s. 3d. net.

Torsiograph investigations made with a single-throw radial engine fitted with a spring hub have shown that the damping inherent in the vibrating system is quite small when the hub damper is not fitted. The combination of spring hub and damper constitutes a positive means of introducing damping into the system, in any required degree. In R. & M. 1053 the author analysed the functioning of the viscous friction Lanchester damper, and made some deductions as regards the operation with solid friction. It was shown that the effectiveness of the damper, with optimum setting, is limited by the size and weight of damper flywheel that can be adopted, and by the strength of the drive. These particular limitations do not apply to the damped spring hub. What the limitations are can be estimated for any particular case by applying the results of the present analysis.

Range of Investigations.—This report contains three main sections. Section I comprises a mathematical analysis of forced torsional vibration for a simple engine system incorporating a spring hub fitted with a viscous friction damper. Viscous friction damping within the crankshaft system is taken into account.

Section II comprises a mathematical analysis of forced torsional vibration for a simple engine system incorporating a spring hub fitted with a solid friction damper, the crankshaft being taken to be so much stiffer than the spring hub as to be treated as being rigid. Viscous friction damping within the crankshaft system is taken into account. The investigation is limited to conditions under which there is no pause at the extremes of motion before the return movement occurs. Such conditions apply for light and fairly heavy damping but not for very heavy damping. The limiting conditions beyond which pauses occur are revealed by the analysis.

Section III comprises applications to some typical problems of the results of the investigations given in Section I and II. A special application of the equations derived in Section I is given whereby the action of a continuously slipping clutch in damping torsional vibrations is examined.

The formula and graphs derived may be applied in making design calculations for dampers to be used in conjunction with spring hubs and couplings for aircraft engines. In general where a solid friction damper is adopted, the slipping torque should be about 80 per cent. to 100 per cent. of the amplitude of the main harmonic forcing torque to be subdued under operating conditions.

TORSIOGRAPH INVESTIGATIONS ON A RADIAL ENGINE WITH AND WITHOUT A SPRING HUB, WITH SOME REFERENCE TO DAMPING. By B. C. Carter, F.R.Ae.S., N. S. Muir, B.Sc., and H. Constant, M.A. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1562. (14 pages and 18 diagrams.) Price 1s. 6d. net.

The spring hubs used in these investigations were made as an outcome of previous torsional vibration research. Torsiograph tests were taken partly to examine the effects of the torque fluctuation in the airscrew drive of fitting a spring hub, both with and without a damper incorporated, and partly to make use of the spring hub in determining the amount of damping present in the engine airscrew system.

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The observed main critical speeds with spring hubs fitted agree reasonably closely with the calculated values. The minor criticals occur at speeds which agree closely with the critical speeds calculated from the main critical speeds.

The effect of fitting an engine with a spring hub incorporating a suitable damper is to remove practically all trace of torque fluctuation in the airscrew shaft at all speeds.

The provision of stops does not serve nearly so well as the provision of a damper, and it is doubtful whether stops are needed when a damper is fitted. If fitted, they should not be arranged to come into contact with spring arms, but should operate between rigid portions on the driving and driven sides of the springs, and the clearance given should be such as to prevent the springs from being over stressed through accidental circumstances.

The degree of damping indicated by theory as being requisite is effective and it can be obtained with a solid friction cone damper of moderate size, loaded by airscrew thrust.

**FURTHER EXPERIMENTS ON A MODEL FAIREY III.F SEAPLANE.** By A. S. Batson, B.Sc., and A. G. Gadd. R. & M. No. 1564. (6 pages and 13 diagrams.) August 9, 1932. Price 6d. net.

The experiments herein described follow on those given in R. & M. 1356,\* which provides data on the spinning properties of a typical float seaplane. The same 1/15th scale model of the Fairey III.F. seaplane was used.

The range of incidence over which rolling and yawing moments due to rolling on model, were measured in R. & M. 1356\* was extended to  $69.8^\circ$ . This included a determination of fin and rudder ( $0^\circ$ ) rolling moment and control due to rudder set to  $+32.5^\circ$ . As at  $60.9^\circ$  incidence, fin and rudder moment was again positive (i.e., helping rotation). Curves of rolling and yawing moments due to rolling measured on wing alone (incidence  $22.4^\circ$  to  $60.9^\circ$ ), showed marked similarity to those for a R.A.F. 15 biplane, gap = chord, stagger  $0^\circ$ .

Elevator hinge moments were measured at  $0^\circ$  and  $30^\circ$  yaw over a range of incidence approximately  $10^\circ$  to  $60^\circ$  for elevator setting  $-35^\circ$  to  $+20^\circ$ . Hinge moment was not altered greatly by angle of yaw of the model and with elevators set to trim, was such as to exert a small force on the control column towards the pilots, which decreased as incidence increased.

\* R. & M. 1356. Spinning of a model of the Fairey III.F. Seaplane.—H. B. Irving and A. S. Batson.

**THE ELASTIC INSTABILITY OF A THIN CURVED PANEL SUBJECTED TO AN AXIAL THRUST, ITS AXIAL AND CIRCUMFERENTIAL EDGES BEING SIMPLY SUPPORTED.** By S. C. Redshaw, M.Sc., A.F.R.Ae.S. R. & M. No. 1565. (15 pages.) May 1, 1933. Price 9d. net.

The stability of a thin circular tube has been dealt with by numerous investigators, and it is of interest to observe that the results obtained by Professors Timoshenko and Prescott, who applied the Rayleigh Ritz Minimum Energy Method, agree very closely with the more rigorous treatment of Professor Southwell. In the analysis Prescott's notation is adopted.

Some experimental investigations are analysed and compared with the analytical results obtained by the application of the theory. A reasonable agreement was obtained for most of the experimental results examined. In each case the predicted critical stress was lower than the actual failing stress which would appear to be reasonable, as a panel will generally support an increase of load beyond the critical load.

No test data is available for panels which approximate to flat plates, and further test data is deemed desirable.

**WIND TUNNEL INTERFERENCE ON WINGS, BODIES AND AIRSCREWS.** By H. Glauert, F.R.S. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1566. (75 pages and 34 diagrams.) September 13th, 1933. Price 4s. 6d. net.

This report provides a comprehensive survey of the subject of wind tunnel interference on wings, bodies and airscrews. The limited extent of the artificial stream of a wind tunnel, bounded either by the rigid walls of a closed type of wind tunnel or by the free surface of an open jet, inevitably leads to some constraint of the flow and to some interference on the behaviour of a model tested in the wind tunnel. This interference could be minimised by using very small models but it is desirable for many reasons that the model should be as large as possible. The study of wind tunnel interference is therefore of great importance since some interference is inevitable, and since an accurate knowledge of this interference will justify the use of larger models than would otherwise be permissible.

The general nature of the interference can be appreciated most readily by considering the conditions in a closed tunnel. If a large body is placed in the stream, the first and most obvious constraint imposed by the rigid walls of the tunnel is that the stream is unable to expand laterally as freely as it would in an unlimited fluid, and in consequence that the velocity of flow past the body is increased, leading to an intensification of the forces experienced by the body. Another choking constraint of a different character arises if there is a wake of reduced or increased velocity behind the body, as occurs respectively with a bluff body or an airscrew. The necessity of maintaining continuity of flow in the tunnel then implies that the velocity and pressure of the stream surrounding the wake will differ from the undisturbed values far in front of the body, and this change of pressure reacts back to cause a change in the force experienced by the body. The interference experienced by a lifting body, such as a wing, is of a different character. The lift of a wing is associated with a general downward movement of the air behind the wing, and the constraint of the tunnel walls on this downwash modifies the behaviour and aerodynamic characteristics of the wing. Finally, a fourth type of interference occurs if there is a gradient of static pressure down the stream of the wind tunnel. This pressure gradient arises owing to the development of the frictional boundary layer of reduced velocity along the walls of the tunnel, which leads to an increase of velocity and a decrease of pressure along the axis of the tunnel. Any body is therefore tested in a slightly convergent stream, and experiences an increased drag owing to the drop of static pressure from nose to tail.

These various interference effects in a closed tunnel or in a free jet are discussed in detail for different types of body, which are grouped conveniently under the headings of wings, symmetrical bodies and airscrews. The basis of the theoretical treatment of the subject is examined critically and the method of analysing particular problems is explained in detail. Experimental results are quoted to justify the theoretical formulae or to derive empirical values to complete the theoretical analysis, and the results required for the practical application of the correction formulae are given in suitable tables and figures. A full list of references is appended to the report.

**FLEXURAL AND SHEAR DEFLECTIONS OF METAL SPARS.** (Part I) By I. J. Gerard, M.Sc., A.M.I.C.E., and H. Boden, B.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1567. (11 pages and 20 diagrams.) September, 1933. Price 1s. 6d. net.

The research of which this is the preliminary stage aims at producing a simple procedure for estimating the ultimate strength of metal spars. The method at present in use is to deduce from a test to destruction of a relatively short sample an apparent failing stress. This stress is then assumed to be characteristic of that spar under loading conditions not confined to those under which the sample spar was tested. This method can give rise to considerable errors and a more satisfactory procedure is urgently required.

Five typical spars, supplied by aircraft firms have been tested within the elastic limit as simply supported beams carrying one or more concentrated lateral loads. No axial loads have been included in any of the tests recorded in this report. The slope and deflection corresponding to a range of lateral loads have been measured. Some tests made in 1928 on the shear deflection of metal spars have also been included in an appendix to the present report.

The apparent values of EI deduced from the measured slopes and deflections over portions of the spar loaded in pure bending (i.e., with no shear) have been found to be independent of the applied load, indicating that within the limited range considered the simple theory of bending is applicable.

**ON THE CALCULATION OF THE CRITICAL REVERSAL SPEEDS OF WINGS.** By D. M. Hirst, M.A. WITH AN APPENDIX ON ROLLING MOMENT INDUCTION FACTORS by G. R. Brooke, Nat. Dipl., and D. M. Hirst, M.A. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1568. (24 pages and 4 diagrams.) September 20, 1933. Price 1s. 3d. net.

In R. & M. 1506\* and 1490,† Roxbee Cox and Pugsley have developed the general theory of the loss of lateral control due to wing twisting for a semi-rigid wing, and experiments and calculation on three elastic wings of rectangular plan form have given results in good agreement with this theory.

The present report describes investigations into the influence of wing and aileron shape and twist distribution on the critical reversal speed, on the basis of this theory. In addition, certain simplifying assumptions which were introduced into the general theory of the semi-rigid wing are here discussed in detail, and a further verification of the usefulness of the semi-rigid theory provided by a calculation on an elastic wing differing in shape and elastic qualities from those previously examined. Finally, a procedure is given for rapidly estimating the reversal speed of a normal wing, and is suitable for design use.

It appears that the most important of the four variables in the analysis, is wing plan form; increase of wing taper considerably increases the reversal coefficient. The prediction of the semi-rigid theory is shown to be reasonably accurate, and this result, following similar comparisons for rectangular wings may be considered to justify the use of that theory for any normal wing.

\* "Theory of loss of lateral control due to wing twisting."—H. Roxbee Cox and A. G. Pugsley (R. & M. 1506, 1932).

† "The aerodynamic characteristics of a semi-rigid wing relevant to the problem of loss of lateral control due to wing twisting."—A. G. Pugsley (R. & M. 1490, 1932).

‡ A semi-rigid wing is defined as one having arbitrarily fixed and unrelated distributions of wing twist and aileron angle, both distributions being independent of aerodynamic loading.

**THE N.P.L. OPEN-JET WIND TUNNEL.** By A. R. Collar, B.A., B.Sc. R. & M. No. 1569. (17 pages and 10 diagrams.) October 19, 1933. Price 1s. net.

The present report deals mainly with preliminary experiments on models, which were carried out to ensure that the projected tunnels should give the best possible aerodynamic performance.

The design finally reached can be briefly described as follows: The tunnel is of the open-jet type, with an elliptical nozzle, of which the major axis is horizontal; it has two return ducts, passing one above and one below the jet. At each of the right-angle corners of the ducts there is a cascade of guide vanes. Immediately before reaching the open working section of the tunnel, the air passes through a contracting channel, which has a square section at the larger end and an elliptical one at the jet, the ratio of the areas being 3.9:1. After passing across the open working section, the air is received in a collector channel of approximately conical form, whose section varies from elliptical to circular. The airscrew is four-bladed, and is situated at the enlarged circular end of the collector cone. Radial blades of aerofoil section are provided in order to neutralise the rotation which would be imparted to the air by the screw.

The power factor of the model was subject to a large scale effect; at the jet speed mainly used during the experimental work, namely, 50 ft./sec., the power factor was 1.8. The variation with Reynolds number indicated that a full-scale power factor of about 2.6 might be expected.

The full-scale tunnel, which has been completed, has equalled expectations. The distribution of velocity in the jet is as good as those of most other tunnels of this type, and the power factor has the predicted value of 2.6. The elliptical nozzle of the tunnel has a horizontal major axis measuring 9 ft. 11 in. and a minor axis of 7 ft. 0 in., and an input of 375 b.h.p. at the airscrew yields an air speed of about 210 ft./sec. in the jet.

**AN IMPROVED MULTITUBE TILTING MANOMETER.** By R. Warden, Ph.D., M.Eng., A.M.I.Mech.E. R. & M. No. 1572. (6 pages and 3 diagrams.) November 23, 1933. Price 6d. net.

A new model multitube tilting manometer designed to overcome the disadvantages of the older models is described. Precautions were taken in the design and manufacture of the instrument to eliminate any danger of trouble due to distortion. The table assemblage rotates about a pin and is roughly balanced about its axis of rotation. The measuring tubes are matched and calibration factors for individual tubes are not required. A method of setting the table is described whereby the actual observations are the values of the standard coefficients ( $P/\rho V^2$ ). A system of "indirect" lighting which gives a bright meniscus and scale against a dark background and eliminates parallax errors and eyestrain is incorporated. A sensitivity and accuracy equivalent to that of a 26-inch Chattock gauge has been achieved.

# MISS BATTEN'S ACHIEVEMENT

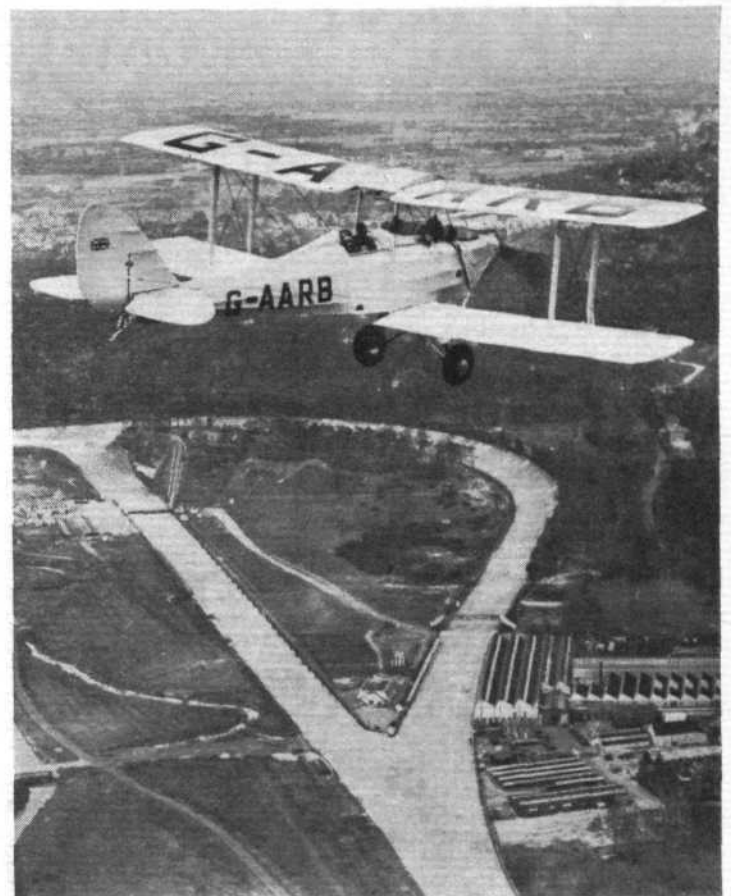
*Lympne to Darwin in less than Fifteen Days*

**A**FTER remaining unchallenged for four years, Mrs. Mollison's time for the Australian flight has been beaten by something like four and a-half days.

Miss Jean Batten's flight has been an epic one, but it must not be forgotten that the ground organisation has been completely changed during the last year or two, and the obstacles she had to face were of a kind that is normally met by long-distance pilots. That Miss Batten found it possible to clip so much time off the "record" of another determined woman is a testimony to the improvements that have been made. The "Gipsy II Moth" she used was not by any means a modern machine, and was, in fact, similar to that used by Mrs. Mollison, her flight was made at the same time of the year, and along much the same route.

The fact that the new time is just twice that of the fastest solo flight yet accomplished—by Sir Charles Kingsford-Smith, flying a Percival "Gull"—does not diminish the achievement, which is likely to have an almost greater effect on the average man or woman's attitude towards aviation. Miss Batten is a typical amateur pilot, with an amateur's experience, and she has persisted in her efforts in spite of two previous failures.

	Miss Jean Batten. May 8-23, 1934. 14 days 23 hrs. 25 mins.	Mrs. Mollison. May 5-24, 1930. 19½ days.	Sir C. Kingsford Smith. October 4-11, 1933. 7 days 4 hrs. 44 mins.
1st day	.. Rome ..	.. Vienna ..	.. Brindisi ..
2nd "	.. Athens ..	.. Constantinople ..	.. Baghdad ..
3rd "	.. Nicosia (Cyprus) ..	.. Aleppo ..	.. Gwadar ..
4th "	.. Damascus ..	.. Baghdad ..	.. Karachi ..
5th "	.. Shaibah ..	.. Bander-Abbas ..	.. Akyab ..
6th "	.. — ..	.. Karachi ..	.. Alor Star ..
7th "	.. Karachi ..	.. Shansi ..	.. Sourabaya ..
8th "	.. Allahabad ..	.. — ..	.. Wyndham ..
9th "	.. Calcutta ..	.. Calcutta ..	
10th "	.. Rangoon ..	.. Rangoon ..	
11th "	.. — ..	.. — ..	
12th "	.. Singapore ..	.. — ..	
13th "	.. — ..	.. Bangkok ..	
14th "	.. Batavia ..	.. Singora ..	
15th "	.. Kuapang ..	.. Singapore ..	
16th "	.. Darwin ..	.. Tjomal ..	
17th "	.. — ..	.. Sourabaya ..	
18th "	.. — ..	.. — ..	
19th "	.. — ..	.. Atambua ..	
20th "	.. — ..	.. Darwin ..	



Miss Jean Batten flying over Brooklands in her "Moth."

Her itinerary is compared in our table with those of Mrs. Mollison and of Sir Charles Kingsford-Smith.

It will be noticed that Miss Batten, after being delayed between Damascus and Karachi, was actually behind time over the first part of her flight, and that Sir Charles, with his very much faster machine, was making daily flights of well over a thousand miles.

The King has sent a message of congratulation through the Governor-General, Sir Alfred Isaacs, and Lord Londonderry's message to Miss Batten was: "I congratulate you on your great flight."

## KING'S CUP AIR RACE—1934

**B**ELOW is the list of entries for the King's Cup Air Race, to be flown on July 13-14. It will be observed that there are two or three entirely new machines on the list, and several familiar ones with new engine installations. As regards the new machines, however, some observations on these are presented in our Editorial Comment on page 530.

Entrant.	Aircraft.	Engine.
H. F. Broadbent ..	"Fox Moth" ..	"Gipsy Major."
Sir D. Hall Caine ..	"Leopard Moth" ..	"Gipsy Major."
F. J. A. Cameron ..	"Leopard Moth" ..	"Gipsy Major."
R. G. Cazalet ..	Monospar "S.T.4" ..	Pobjoy "R."
O. W. Clapp ..	"T.K.1" ..	"Gipsy III."
A. H. Cook ..	Comper "Swift" ..	"Gipsy Major."
G. de Havilland ..	"Coupe Moth" ..	"Gipsy Major."
E. L. Gandar Dower	British Klemm ..	"Gipsy VI."
	"Eagle" ..	
	"Puss Moth" ..	"Gipsy III."
H. R. A. Edwards ..	"Martlet" ..	"Gipsy I."
Mrs. G. D. Whitney-Elmhirst	Hendy "Heck" ..	"Gipsy IV."
R. E. Gardner ..	Monospar "S.T.6" ..	2 Pobjoy "R."
A. Henshaw ..	"Leopard Moth" ..	"Gipsy Major."
E. Hicks ..	"Leopard Moth" ..	"Gipsy Major."
Miss E. M. Jackaman	"Moth" ..	"Gipsy II."
E. W. B. Leake, ..	Percival "Gull" ..	"Gipsy VI."

Laurence Lipton ..	"Moth" ..	"Gipsy III."
F. S. Moller ..	Hendy "Hobo" ..	Pobjoy "R."
Herbert Musker ..	British Klemm ..	Pobjoy
	"Swallow" ..	"Cataract"
C. S. Napier ..	Hendy "302" ..	"Hermes IV."
Lord Nuffield ..	Hawker "Tomtit" ..	Wolseley
		"A.R.9."
A. L. Paterson ..	Miles "Hawk" ..	"Cirrus IIIA."
R. P. P. Pope ..	Comper "Swift" ..	Pobjoy "R."
W. R. Porter ..	"Leopard Moth" ..	"Gipsy Major."
H.R.H. Prince George	Percival "Mew Gull" ..	"Gipsy VI."
Sir Charles Rose ..	Miles "Hawk" ..	"Gipsy VI."
G. R. D. Shaw ..	Miles "Hawk" ..	"Gipsy III."
A. Snagge ..	Miles "Hawk" ..	"Cirrus III."
W. S. Stephenson ..	Monospar "S.T.10" ..	Pobjoy
		"Niagara."
S. P. Symington ..	Comper "Swift" ..	Pobjoy "R."
Lord Wakefield ..	"Dragon" ..	"Gipsy VI."
K. H. Williams ..	Percival "Gull" ..	"Gipsy VI."
Sir Norman J. Watson	Comper "Kite" ..	Fobjoy
		"Niagara."
	Comper "Mouse" ..	"Gipsy Major."
Lady "Wakefield" ..	Comper "Streak" ..	"Gipsy Major."
A. E. Borton ..	Air Speed ..	Napier
	"Courier" ..	"Rapier."
W. S. Stephenson ..	"Desoutter I" ..	"Hermes II."

# AIRISMS FROM THE FOUR WINDS

## Honour for Wiley Post

The I.A.F. has awarded its gold medal to Mr. Wiley Post, who last year made a record flight round the world in a Lockheed "Vega."

## Vought Aircraft for Germany

Six single-engined biplanes (probably "Corsairs") have been ordered, by Deutscher Luftsport Verband, from the Chance Vought Corporation, for use as training aircraft.

## Woman Engineer on "Graf Zeppelin"

When the *Graf Zeppelin* started on the first trip of the season to South America, the crew included Fraulein Kerin Mannesmann as assistant engineer.

## A Dewoitine Modification

The Dewoitine D-331 cantilever monoplane, developed from the "Traité d'Union," is to have its single Hispano-Suiza 1,000-h.p. engine replaced by two Gnome-Rhône 14 Kdrs. radials.

## South Atlantic Flight

On Monday, Jean Mermoz flew the *Arc en Ciel* over the South Atlantic to Brazil for the second time. This machine is a Couzinet with three Hispano-Suiza engines.

## Coupe Deutsch Machine's Record

By covering 100 kilometres at an average speed of 268.235 m.p.h., M. Raymond Delmotte has set up a new record. He was flying a special Caudron monoplane, with a 300-h.p. Renault-Bengali engine, which was entered for the Coupe Deutsch.

## Italian Air Increase

In the course of a speech to his Chamber of Deputies, Signor Mussolini declared that a thousand million lire would be spent in "renewing the air fleet." The Italian Air Ministry later announced the institution of a "department of high altitudes for navigation in the stratosphere."

## Notices to Airmen

Pilots are asked not to fly below 3,000 ft. within three miles of the Epsom racecourse (June 5-8) and of Ascot racecourse (June 19-22). They are also requested not to fly near Hendon aerodrome between 3 and 5 p.m. to-day, when the Prince of Wales opens the new Metropolitan Police College.



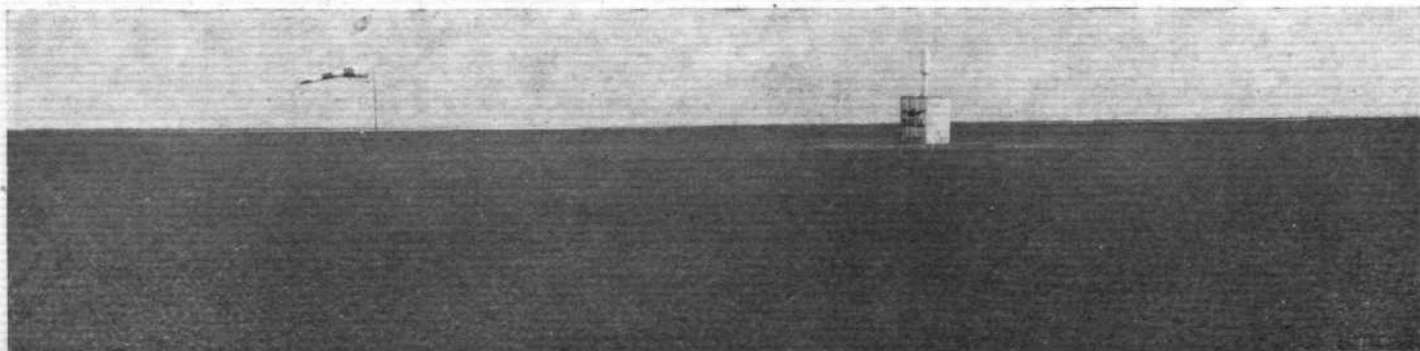
OVER NEW YORK: Major Alexander P. de Seversky flies his latest type, which may yet be entered for the "MacRobertson."

## Cierva at London's Bus Factory

Accompanied by Don Luis Bolin, London correspondent of a leading Spanish "daily," Don Juan de la Cierva paid a visit by Autogiro last Monday to the works of the Associated Equipment Company at Southall—makers of London's buses. Before touring the factory he gave a demonstration.

## "Paper"

The aeroplane has added one more achievement to its list—that of providing English people on the Continent with English dailies on the dates of issue. There are regular newspaper services, for Messageries Hachette, to Paris, Brussels, Amsterdam, Rotterdam, Cologne, and Copenhagen.



SOLITUDE! The Shell aircraft refuelling station at "Bidon 5," on the most westerly of the three routes across the Sahara from Oran to the French Sudan. It is situated some 300 miles from the nearest form of vegetation!

### Fokker says that—

The performance figures of American aircraft constructed by such firms as Douglas and Lockheed are, in every respect, reliable.

### A Chinese Visit

After having made a study of aeronautics in the U.S.A., a Chinese military mission, under General Wong Kong Sue, are soon to make a similar study in England, France, Germany, and Italy.

### "Croix du Sud" in Naval Manœuvres

The Latécoère 300 civil flying boat *Croix du Sud* (four Hispano-Suiza 12 Nbrs.), which recently made a double Atlantic crossing, is taking part in the French naval manœuvres off Brittany.

### International Brussels Meeting

France and Italy will probably be represented at the aviation meeting at Brussels on June 3. The former country will send a detachment of service aircraft, and Italy will send an "aerobatic squadron."

### Crouch-Bolas "Dragonfly" Tested

Designed to possess the landing qualities of an Autogiro while retaining the performance and handling characteristics of a conventional aircraft, the Crouch-Bolas "Dragonfly," fitted with two Menasco engines, has recently made its first test flight.

### Brooklands "At Home"

On June 2 an "At Home," organised jointly by Hawker Aircraft, Ltd., Vickers (Aviation), Ltd., and the Brooklands Flying Club, Ltd., will be held at Brooklands. Members of squadrons equipped with Hawker and Vickers aircraft will be invited, and all private owners and those interested in the aircraft industry will be the guests of the Brooklands Flying Club, Ltd. No members of the public will be admitted. The entertainment will consist mainly of demonstrations by test pilots and probably a Concours d'Elegance for private owners.



**AIR DAY :** Some idea of the number of people who flocked to the aerodromes may be gathered from this picture taken at Kenley.

### Aeroplanes v. Locusts

Two machines are being fitted out for operations against locusts in Natal. They will attack the insects with sodium arsenite when they are on the ground.

### Twenty-five Years Ago

From *FLIGHT* of May 29th, 1909.

"Some experiments have recently been carried out at Bagatelle by M.M. Labanhie and Puthet with a glider of the biplane type, having a spread of 6 metres. The apparatus, which, with M. Puthet on board, weighs 100 kilogs., has been hauled along the Bois des Boulogne at speeds varying from 20 to 40 kiloms. an hour, and glides of from 300 to 400 metres have been made."

### The Spreading Fever

The Turkish Government have decided, in view of the troubled state of Europe and the evidence of a new arms race, to increase the size of the Republican forces—and, in particular, the air force.

### Manchester's Airport

The airport question is still troubling Manchester, and the latest suggestion is that Woodford should be used.

### Expressionism

In our description last week of the Deschamps diesel we remarked that the exhaust collector is allowed the maximum freedom of expression. Obviously this word should have been *expansion*.

### Soviet "Air Train"

A flight of a thousand miles was carried out last week by one aeroplane with three gliders in tow, the idea being, one imagines, that odd "coaches" may be slipped when necessary on a journey. Presumably the train landed piecemeal.

### Who will Attack?

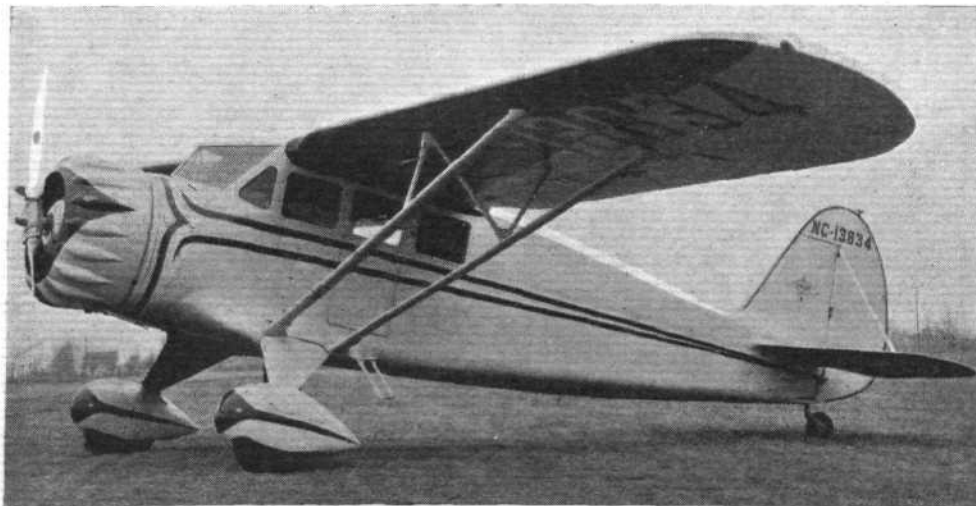
A book on air defence by General Goering has recently been published in Germany, in which the "campaign of fear" reaches high-water mark. Now that every country is afraid of attack, it would be amusing to discover who is left to do the attacking.

### Klemm "Eagle" Flying

The new British Klemm "Eagle," which was described in *FLIGHT* on November 9, 1933, has made several flights at Hanworth during the last few days. With the undercarriage raised it is particularly clean, as the wheels are raised outwards into the lower surface of the wing. The machine is noticeably quiet.

### Aerial Photography Exhibition

The exhibition of aerial photography and survey to be held at Irving Hall, Bush House, Aldwych, from June 4-9, will be opened by the Rt. Hon. the Marquess of Londonderry, Secretary of State for Air. This exhibition is of great interest at the present time, in view of the fact that a scheme is in hand for the rapid revision of the Ordnance Survey Plans.



**THE STINSON "RELIANT" :** This is the 1934 model, which, powered with the Lycoming 225 h.p. engine, carries four passengers in an unusually comfortable cabin. The basic design is similar to that of previous Stinson machines, examples of which have been seen in this country. The cruising speed is 115 m.p.h.

# COMMERCIAL AVIATION

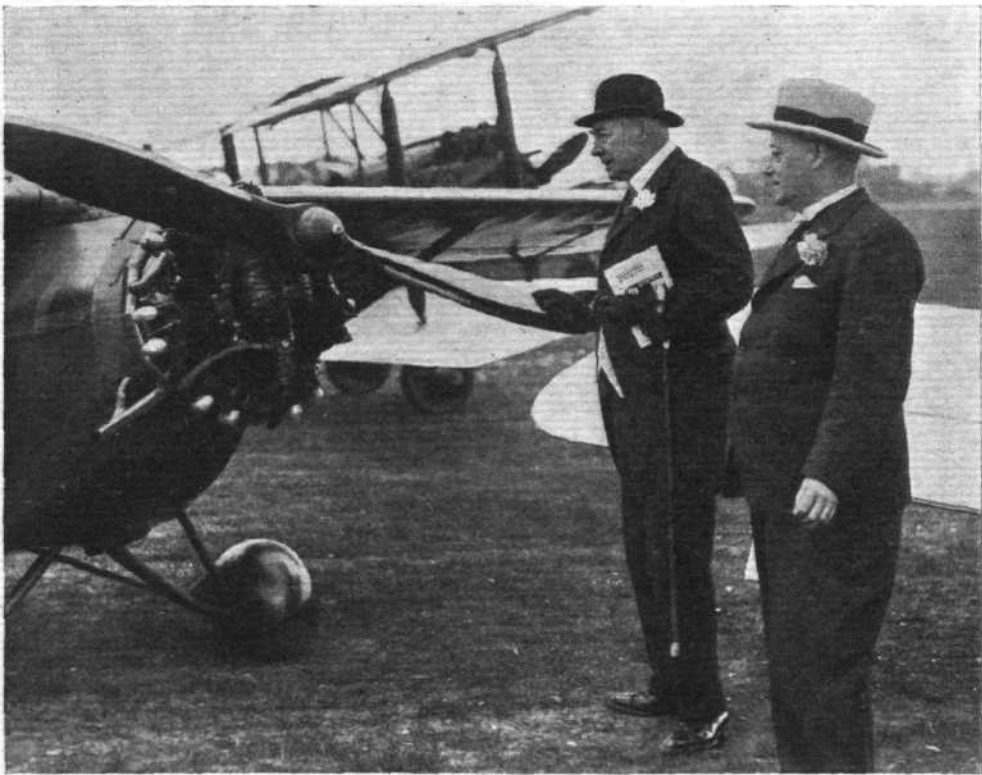
## — AIRLINES — AIRPORTS —

### DONCASTER'S AIRPORT OPENED

*Lying on the route between North and South, Doncaster's new airport might well be called the Gateway to the Industrial North*

**L**ORD LONSDALE, that doyen of sportsmen and supporter of enterprise, opened Doncaster Airport on May 26. In a short speech, after the inaugural luncheon held at the Mansion House prior to the opening ceremony, Lord Lonsdale expressed the hope that the enterprise would be as successful and as beneficial to Doncaster as had been the coming of the railway works.

The establishment of this aerodrome was primarily due to the energy and foresight of the Doncaster Race Committee, a body which is responsible for the conduct of the horse-race course, which lies on the opposite side of the road to the aerodrome. Back in 1928 the Committee decided that the waste ground opposite the race course would make an admirable site for their aerodrome, and this opinion was confirmed by Sir Alan Cobham. The road separating the race course from the aerodrome is the Great North Road, which is the main entrance to Doncaster, and along it, by motor car, the centre of the town can be reached in four minutes. This fact alone makes it almost unique among municipal aerodromes. A further advantage is the proximity of the main line of the L.N.E. Railway, because the ground lying between the aerodrome and this line is available for the development of aircraft factories or similar concerns. The site itself was originally partly composed of a house-refuse tip which had been burning for a very long time, and it is the resulting clinker and ashes which have been used to level up the 120 acres or so which are at present used for the landing area. This work has all been done by the Borough Estate Surveyor's department under the direction of Mr. R. E. Ford, and a very fine job he has made of it. The aerodrome itself is on a



Lord Lonsdale with Councillor E. Wilburn examining the Shell-Mex & B.P. Co.'s Comper "Swift" (Pobjoy) after the opening of the Doncaster airport.

sandy sub-soil, so that with the grass-knit top surface it will be admirably drained. An approach road has been constructed from the Great North Road, and at the end of this, offices, control tower, hangars, etc., will be constructed at a later date as the demand shows them to be necessary. At the present time the total area which has been ear-marked for development is some 420 acres, which will allow the establishment of an aerodrome with runways of over 1,000 yd. in all directions. Apart from its situation with regard to the town of Doncaster, this aerodrome should rapidly become of great importance, as it lies on the air

route between London and Newcastle, and therefore on the route to Scotland, and also on the route between Liverpool and Hull, over which the Royal Dutch Air Lines will, this week, inaugurate a service from Amsterdam to Liverpool.

At the aerodrome after the inaugural luncheon Lord Lonsdale was introduced to those present by the Chairman of the Race Committee, Councillor E. Wilburn, and after making his opening speech Lord Lonsdale was thanked by the Mayor of Doncaster, Councillor G. H. Ranyard. Following this opening ceremony, Sir Alan Cobham's National Aviation Day Display was started, and was received with great enthusiasm by the

Final Place	Club and Pilot	Aircraft and Engine	Finishing Time	Speed, m.p.h.	Starting Time
1	Yorkshire (G. Garnett)	"Puss Moth" (Gipsy III)	89 59	118½	21 31
2	Brooklands (E. Walter)	"Moth" (Gipsy I)	90 48	93	3 45
3	Northants (E. Danson)	"Moth" (Gipsy I)	91 01	92½	3 23
4	Yorkshire (W. Adams)	"Moth" (Gipsy I)	91 34	92	3 18
5	Brooklands (R. Opie)	"Moth" (Gipsy I)	92 25	91	3 23
6	Brooklands (R. Morris)	"Moth" (Gipsy I)	92 43	90½	3 28
7	Midland (G. Davison)	"Puss Moth" (Gipsy III)	94 17	112	22 04
8	Midland (L. Hodgson)	"Puss Moth" (Gipsy III)	94 32	111	21 31
9	Midland (H. Johnson)	"Puss Moth" (Gipsy Major)	95 16	114	24 13
10	Hanworth (A. Gibbons)	"Klemm" (Gipsy III)	95 23	120½	28 07
11	Hanworth (G. Harben)	"Puss Moth" (Gipsy III)	98 45	106½	22 37
12	Hanworth (A. Tweddle)	"Moth" (Cirrus III)	100 30	80½	0 00
13	Northants (J. Linnell)	"Moth" (Gipsy I)	122 14	69	4 38
	London (V. Parker)	"Moth" (Gipsy Major)		Retired	14 01
	London (A. Cook)	"Tiger Moth" (Gipsy Major)		Retired	12 36
	Yorkshire (J. Micklethwait)	"Moth" (Cirrus III)		Retired	0 00
	Northants (G. Linnell)	"Avian" (Hermes II)		Retired	9 36
	London (L. Lipton)	"Moth" (Gipsy III)		Retired	18 35

AGGREGATE RESULTS

1, Brooklands, 2 + 5 + 6 = 13. 2, Yorkshire, 1 + 4 + 14 = 19. 3, Midland, 7 + 8 + 9 = 24.

large crowd which lined the roads. His display is a set and regular one, which was fully described in our report of the opening meeting at Dagenham, which appeared in FLIGHT of April 19.

At the Dagenham Display Miss Joan Meakin was not able to have the towing arrangements of her glider prepared to the approval of the Air Ministry. Apparently this trouble has now been overcome, and Joan Meakin was towed up by a "Mongoose Avro." Her display of careful gliding, carried out over the aerodrome while she lost height after casting off from the towing machine, attracted the crowd greatly. Perhaps the most spectacular part of Miss Meakin's display was her beautifully-controlled side slip preceding her landing. Other high lights of the display which attracted attention were the crazy flying of Mr. Jock McKay, and the aerobatic and inverted flying of Mr. G. Tyson. His "bombing" with flour bags during the humorous part of the entertainment is astoundingly accurate.

During the luncheon the Doncaster Aerial Navigation Competition was flown off. This was a test open to all flying clubs in the British Isles. A team of three aircraft was entered by each club, and had to be flown by "A"

or "B" licenced pilots who were not professional pilots. The chief idea was that the machines had to fly round a course to points (generally race courses) where, on the ground, they would see ground marks giving them directions for the next leg. Marks were awarded to the machines according to their final placing, and the winning team was that which had the least aggregate of place numbers. The handicapping was done by those "arch-experts" Messrs. Dancy and Rowarth. The Cups presented for this competition were unique. They were two in number, one plain silver and one silver gilt, and both of massive and magnificent proportions. They were originally put up for competition for the best flights at the flying meeting held at Doncaster race course in 1909. None of the flights was considered by the Race Committee to be of sufficient merit to warrant the presentation of these Cups. They were, therefore, stowed away in the city's vaults, and have only now for the first time been taken out again to be competed for in this inter-club competition. These two Cups were won outright on Saturday, and the only stipulation is that in the case of the club becoming defunct the Cup is to be returned to the Doncaster Corporation for further competition.

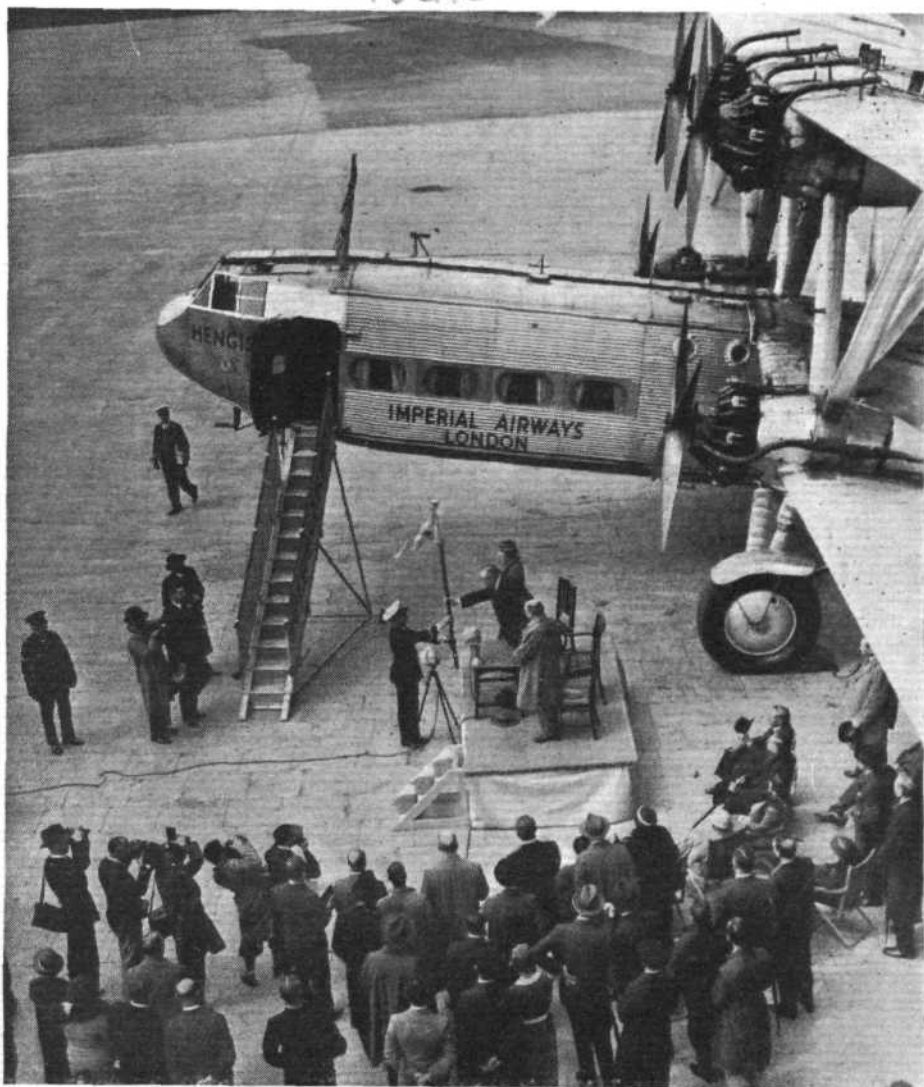
## AIR MAIL PENNANT PRESENTED

*Ceremony at Croydon before departure of Indian Mail*

**H**ENGIST, one of Imperial Airways' fleet of H.P.42's, left Croydon, on Saturday last, carrying the first Royal Air Mail pennant. Just previous to the departure of the machine, Sir Kingsley Wood, the Postmaster-General, had presented this pennant to Imperial Airways. The pennant, besides being carried henceforward in all machines used for the transport of mails, will also be flown over buildings where air mails are embarked or disembarked. A description and drawing of the pennant were published in FLIGHT last week.

The ceremony of presentation was performed on the "apron" at Croydon with *Hengist* as a background. Sir Eric Geddes, chairman of Imperial Airways, who presided, thanked the Postmaster-General for the honour conferred upon the company by being granted recognition for the carriage of mails similar to that given to the Mercantile Marine. It was necessary, he said, to travel over the long Empire routes in order to learn what the air mail meant, especially to the women. Lives of inhabitants of towns which were almost unknown had been completely changed by the air mail.

Sir Kingsley Wood, the Postmaster-General, said that the ceremony marked a very definite step in the development of civil aviation as a carrier of mails. For many years it had been the practice for ships conveying mails under contract with the Postmaster-General to fly at the mast head a special pennant bearing the Royal Crown and the words "Royal Mail." The flying of the mail pennant had always been considered as placing the ship which carried it in the very highest category of merchant shipping. Development, during the last few years, had been such that air services had definitely established themselves as indispensable to the carriage of express mail, and the public was showing a constantly increasing recognition of their value. During the last three years the Imperial air services had doubled their carryings, and the Indian air mail, carried weekly from Croydon, now approximated  $\frac{1}{2}$  ton or between 40,000 and 50,000



THE ROYAL AIR MAIL: Sir Kingsley Wood, the Postmaster-General, presents the first Royal Air Mail Pennant to Sir Eric Geddes, who hands it over to Capt. H. J. Horsey of the good ship *Hengist*. (FLIGHT Photo.)

letters. The rather long and slow infancy of the air mail had developed into a very vigorous youth, and it was on the highway to a maturity of which few, at this moment, could form any idea. To celebrate this stage of development Sir Kingsley Wood said he had great pleasure in

presenting to Imperial Airways the new air mail pennant which, he hoped, would soon be a common sight in every part of the Empire.

Sir Eric Geddes received the pennant and passed it to Capt. H. J. Horsey, who immediately carried it into the pilot's cabin of *Hengist* and hoisted it beside the civil aviation ensign.

Lady Geddes was presented with a silver model of an air liner. Among those present at the ceremony were Marshal of the R.A.F. Sir John Salmond, Sir Walter Nicholson, Mr. G. E. Woods Humphrey, Mr. H. Scott-

Paine, Sir George Beharrell, and Sir Samuel Instone (Directors of Imperial Airways), and the Iraqi Minister, Jasar Gasha Gloskeri, the Agent-General for Western Australia, Sir Hal Colebatch, the Mayor of Croydon, Mr. J. Trumble, Brig-General R. Ridgway, of the International Air Post Exhibition, the Chief Aerodrome Officer, Maj. L. F. Richard, the Commissioner of East African Dependencies, Maj. C. H. Dale, the Deputy Director of Civil Aviation, Mr. S. G. L. Bertram, a Director of Railway Air Services, Mr. S. B. Collett, and the High Commissioner for India, Sir Harry Lindsay.

## CROYDON

ON Empire Day at the Airport of London, Croydon, things started at about 6 a.m., when Mr. "Jim" Mollison took off in the Air Taxi, Ltd.'s "Hawk Moth," which was described in one newspaper, not inaptly, as the "all red" aeroplane. First stop was Cranwell, where cadets were just about to parade; then to Hedon (Hull) via Brough-Newcastle-Renfrew (Glasgow), where a special welcome awaited him; next to Blackpool, and then through the Midlands to Henlow, "and so home mightily content with my journey," as Pepys would have said. Mollison landed at Croydon at about 9 p.m. Mr. William Courtenay accompanied Mr. Mollison.

The other Empire Day flight was that of the new Imperial Airways, Ltd., D.H.86, which took a party of Press representatives from Croydon to numerous aerodromes in England and Ireland. Such was the enthusiasm wherever this aeroplane landed that it was impossible to keep to schedule, and therefore as many places as were contemplated could not be visited. Capt. O. P. Jones was in command.

Maj. Brackley, Air Superintendent, Imperial Airways, Ltd., tells me he is more than content with the performance of "Diana," and Capt. Jones enthusiastically agrees.

There were continuous streams of visitors to the Airport on Empire Day, and about £60 was taken at the gate in sixpences. Some 3,000 people visited and were shown round the aerodrome—a record for a single day.

On Saturday, May 26, there was an interesting ceremony—described elsewhere—when Sir Kingsley Wood, P.M.G., formally presented the first Air Mail pennant to

Sir Eric Geddes, Chairman of Imperial Airways.

Mr. Roy Tuckett, who has been making a photographic survey of the England-Australia route, sold his machine to a Chinaman in Singapore and returned without it. He landed at Croydon by Imperial Airways last Wednesday.

Olley Air Service is still overwhelmed with work. Mr. Ledlie has been on a 14-day "family tour" with an American family, five in number. The tour included Paris, Brussels, Berlin, Rome, etc. For those who want to see Europe at top speed, there is no doubt that a tour, arranged in advance to the minute and performed by air with a company catering for this sort of work, is an ideal American tourists have been yearning for for years.

Mr. Roche, late of Imperial Airways, and earlier of Instone Air Lines, has been at the Airport for a few days before taking up his new appointment as Municipal Airport Officer, Hull, in readiness for the opening of the K.L.M. Liverpool-Hull-Holland service on June 1. Mr. E. D. Coundell, of "Aircraft Exchange & Mart, Ltd.," in picking up a passenger at Yeovil, whose destination was Hooton, flew Hanworth-Yeovil-Hooton-Whitchurch-Yeovil-Croydon in 4 hr. 25 min., at an average speed of 124 m.p.h., with a Napier "Javelin"-powered Percival "Gull" on May 22. Provincial Airlines, Ltd., were running with absolutely full machines last week, when a thrice daily service between Croydon and Plymouth was maintained, 6,945 miles flown and 95 passengers carried.

On Empire Day, Surrey Flying Services, Ltd. joy-riding went on ceaselessly from dawn to long after dusk.

A. VIATOR.

## HESTON

THURSDAY, May 24th, Empire Air Day, brought really perfect flying weather, and a representative collection of aeroplanes was gathered on the tarmac. 1,664 people were admitted to the public enclosure; 1,339 were taken on conducted tours of the airport, and 172 took joyrides in the British Air Navigation Company's "Dragon." Sightseers were particularly lucky in the direction of the wind, which enabled them to get a close-up view of each aeroplane as it approached to land. The Comper Aircraft Company exhibited two of their products, the "Swift" and the "Mouse." Flt. Lt. Comper took off on Thursday for Etampes in the one and only "Streak," to take part in the race for the Coupe Deutsch, and they were therefore unable to exhibit this, their latest product. A searchlight company of Middlesex Territorials placed on show a large army anti-aircraft searchlight, which they explained to the visitors on conducted tours.

Heston and Le Touquet seem to be bound together by a kind of horizontal gravity. Apart from the regular air-

lines, over twenty private aeroplanes made it their weekend destination. "June" (Lady Inverclyde), Lord and Lady Willoughby de Broke, Mrs. Horlick, Mr. and Mrs. Charles Sweeny and Count and Countess Munster were among B.A.N.C.O.'s passengers, which totalled 170 over the week-end—Friday to Monday, inclusive. During the same period, Jersey Airways carried 128 passengers. Wrightson & Pearce carried 45 passengers to the Continent, and Portsmouth, Southsea & Isle of Wight Aviation, Ltd., carried 36 passengers between Heston and the Isle of Wight.

Mlle. Lotfia el Nadi, the first Egyptian lady pilot, arrived in England on Whit-Monday, and has already been flying at Heston.

The Atlantic fliers, Pond and Sabelli, landed at Heston at 12.30 p.m., May 25th, in their Bellanca monoplane. At the time of writing their plans are not yet settled, but their machine is remaining at Heston while the engine receives some necessary attention in the Airwork shops. Afterwards they intend to fly non-stop to Rome.

## EGYPTIAN AIR SERVICES

ALTHOUGH stormy weather and thunderstorms were experienced in Cairo and Alexandria during the period May 8-14, the regular Misr-Airwork air services were run to schedule and without discomfort to the passengers. The Alexandria-Cairo machine arrived at Almaza during the height of the storm on May 13th 15 minutes early, owing to a following wind. During this period 136 passengers were carried on the Cairo-Alexandria service, and 23 on the Egypt-Palestine service—a total of 159 passengers. Through tickets from Cairo to Beirut will be obtainable on the Misr-Airwork Palestine service, passengers travelling to Haifa by air and continuing the journey to Beirut by car.

The first service to Port Said was scheduled to leave Almaza on May 24th, and thereafter three times a week, in both directions, on Tuesdays, Thursdays and Saturdays, the times of departure and arrival being:—Almaza, depart 10.15 a.m. (Tuesdays and Thursdays), 7.35 a.m. (Saturdays); arrive Port Said 11.30 a.m. (Tuesdays and Thursdays), 8.50 a.m. (Saturdays). Port Said, depart 3.10 p.m. (Tuesdays and Thursdays), 10.40 a.m. (Saturdays); arrive Almaza 4.15 p.m. (Tuesdays and Thursdays), 11.45 a.m. (Saturdays). These timings connect with the regular Cairo-Alexandria service, and the times on Saturdays allow Port Said travellers to catch the Alexandria Race Special, leaving Almaza at 12 noon.

# MACROBERTSON NEWS

*Several entries already received and some extremely fast aircraft reported under construction in America, France and Italy*

**B**Y 12 noon, on June 1, all entries must be made for the MacRobertson London-Melbourne races. During the past few days quite a substantial batch has been received by the Royal Aero Club from America, Holland, Italy and France. Enthusiasm runs high in all these countries, especially America, whose aircraft constructors are "telling the world" that the race is "right up their alley." We are glad to know they are so keen about it, for now some of our incredulous designers and aircraft operators will have an opportunity of studying the behaviour of some of the latest types of American high-speed long-range aircraft.

One of the first American entries to be received is the Wedell Williams monoplane entered by the Wedell Williams Air Service Corp., to be flown by "Jimmy" Wedell, of Patterson, Louisiana. The exact nature of the machine has not yet been disclosed, but it seems probable that it will be a modification of the low-wing racer in which Col. Roscoe Turner has been making a series of extremely fast long-distance flights in the U.S.A. during the last few months. He recently covered the 560 miles between Detroit and New York at an average speed of 315 m.p.h. This machine holds the world's speed record for landplanes. It is a low-wing wire-braced monoplane with Pratt & Whitney "Hornet" engine. The fuel capacity of the modified version is not known, but the original type carried 150 U.S. gallons.

A Lockheed "Orion" will be flown by R. F. Lape on behalf of the Lyon Flight Expedition Co. of San Francisco. The standard "Orion" 9D., as used, at present, on several air lines, has a maximum speed of 230 m.p.h., when using a Pratt & Whitney "Wasp" S.1D.1 supercharged engine giving 550 h.p. at 5,000 ft. In this form six passengers are carried, but fuel tanks for long-range work could easily be fitted in place of the passenger accommodation. With normal tankage the cruising range is 750 miles. The machine is a low-wing cantilever monoplane with retractable undercarriage.

As we go to press we learn that Miss Louise Thaden, of Kansas City, will fly a Beech A.17F., probably a development of the Beech biplane recently described in FLIGHT. Russell Hosler, of New York, has entered a Hosler Mono-Airplane, and J. Cochran, of the same city, will fly a 2 P.L.C.M. machine.

## Dark Horses

Our contemporary, *Western Flying*, informs us that there are a number of additional prospective entrants for the race in the United States. Mr. Howard Hughes, the young film producer, may enter the Speed Race with a mysterious aeroplane which is being constructed at Glendale. As the construction of the machine is in the hands of "Nick" Palmer, a member of the engineering staff of Mr. Gerald Vultee, who did a large amount of work on the Airplane Development Corporation's V-1 (described in FLIGHT for March 22), it may be that Mr. Hughes' racing machine may bear some resemblance to this aircraft. A top speed of 225 m.p.h. is claimed for the V-1. A glance through the keyhole of the factory revealed a number of wind tunnel models. One of these was a low-wing monoplane with retractable undercarriage powered with a two-row radial engine.

Keith Reider, a well-known figure in American racing circles, is reported to be building a low-wing racing monoplane carrying enough fuel to cover each stage of the race in one hop. It is not definitely known if this is the same machine which is being built at the Menasco plant at Los Angeles. There is talk of Roscoe Turner, who has done much high-speed flying, especially in the Wedell Williams monoplane, flying a machine provided for him by a wealthy American. At present he is supposed to be in Detroit supervising the construction of the new racer.

Wiley Post has been working, of late, on his Lockheed "Vega" ("Wasp"), *Winnie Mae*. Reports have been circulating for some time that he intends to make a high altitude flight with this aircraft, and yet other rumours say that he is "hotting up" the machine for the MacRobertson race.

Another rumour is current in the U.S.A. that the

Northrop Company is building a machine for the race. This company, of course, has had a large amount of experience in the construction of suitable machines, the "Gamma" and the "Delta" types being two particularly good examples.

Other names which have been mentioned in connection with the races are A. D. Knapp, "Martie" Bowman and "Art" Goebel. It would also appear that Maj. Alexander P. de Seversky intends to enter one of his machines, which was originally designed as an amphibian, but has now been converted to a landplane. At present this aircraft is fitted with a Wright "Whirlwind" of 420 h.p., and has a top speed as a landplane of 235 m.p.h. If the supercharged Wright "Cyclone" is fitted, however, this speed would be raised to about 290 m.p.h. The Bellanca machine described in FLIGHT last week will be flown by Col. Fitzmaurice with Mr. E. W. Bonar, M.B.E., as second pilot. It seems that the machine will not have trailing edge flaps as reported. Neither will it be fitted with a Wright "Cyclone," but a Pratt & Whitney engine of similar power. A "keel" will be dropped below the fuselage when the undercarriage is retracted. The occupants will be accommodated in two tandem cockpits near the tail. Sir Charles Kingsford-Smith will probably use a Lockheed "Altair."

## Commercial Types

The K.L.M. Company has already entered four machines. One of these, a Douglas D.C.2 "Airliner," will be entered for the Speed Race. The Douglas was fully described in FLIGHT of March 1, 1934. The remaining machines are all Fokkers—the F.XXXVI, F.XXII and F.XVIII. Of these three, the first two are four-engined cantilever monoplanes fitted with four Wright "Cyclones" and four Pratt & Whitney "Wasps" respectively. The top speed in both cases is rumoured to be about 165 m.p.h. The F.XVIII, of course, is a standard K.L.M. type, using Pratt & Whitney "Wasp" engines. In its original form the machine was capable of 152 m.p.h., but when fitted with "Wasps" of the S.1D.1 pattern the speed is raised to 171 m.p.h. The pilots will be K.D. Parmentier for the Speed Race, I. W. Smirnoff, G. M. H. Frijns and J. J. Moll for the Handicap Race.

Signor Lombardi has entered a Bergamaschi P.L.3 fitted with a Fiat A.59 engine. He will be accompanied by Vittorio Suster. The aircraft is being built by the Cantieri Aeronautici Bergamaschi of Ponte San Pietro, and is a low-wing monoplane with retractable undercarriage. There are rumours of other Italian machines being prepared which all appear to be low-wing cantilever monoplanes with retractable undercarriages. It was reported some time back that Capt. Oswaldi Baldi, who won the Bibesco Cup in 1923, will fly a Caproni "Sauro" low-wing monoplane. This machine was originally designed for an engine of 130-150 h.p. and had a top speed of 150 m.p.h. If entered for the race, however, it would probably be fitted with an American engine of greater power, when the top speed would be raised to about 200 m.p.h.

One entry has been received from France. This is from Capt. Challe, who will use a Wibault 366 with a Hispano-Suiza engine. There is talk of machines being prepared by several well-known French constructors, including Mm. Couzinet and Blériot. The Couzinet type was briefly described in FLIGHT of April 12 this year. M. Michel Detroyat has bought a Lockheed "Orion" which may be entered.

Mr. H. F. Broadbent, an Australian, has entered a D.H. "Fox-Moth" (Speed Model) for the Handicap Race, and we understand that Mrs. Victor Bruce has accepted an order from New Guinea for a Fairey "Fox" equipped with long-range tanks. Mrs. Victor Bruce has lately been using one of the old "Foxes" with a Fairey "Felix" (Curtiss D.12) engine, the type which caused such a sensation about ten years ago, so that it would seem that this machine is the subject of the order from New Guinea. *Seafarer*, the D.H. "Dragon" formerly owned by the Mollisons, has been bought by Mr. L. Reid, but it is not known if this machine will be used for the race.

# THE ROYAL AIR FORCE



London Gazette, May 22, 1934

## Stores Branch

F/O. on probation H. C. Adams is confirmed in rank (April 20).

## Medical Branch

Flt.-Lt. J. Parry-Evans, M.R.C.S., L.R.C.P., D.L.O., is promoted to the ranks of Squadron Leader (May 19).

The follg. Flying Officers are promoted to the rank of Flight Lieutenant (May 1):—J. McGovern, M.B., B.Ch.; J. F. Dales, M.R.C.S., L.R.C.P.; T. D. L. Bolan, L.R.C.P.; and S. R. E. W. Fisher, M.B., B.Ch.

## Memorandum

Lt. (Temp. Capt.) E. J. Street relinquishes his commission on account of ill-health and is permitted to retain the rank of Capt. (August 26, 1919). (Substituted for the notification in the Gazette of August 26, 1919.)

## ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

### General Duties Branch

S. Davidson is granted a commission as Flying Officer in class A (February 3). The follg. Pilot Officers are promoted to the rank of Flying Officer:—R. W. Aitken (February 10, 1933); S. O. Tudor (November 7, 1933); J. D. Tucker (December 6, 1933); J. P. Sloan (December 14, 1933); R. S. Jukes (December 20, 1933); H. G. Goddard, B. E. Knight (January 4); J. A. Tinné (January 5); M. L. Docker (January 11); E. F. Tyler (January 13); M. M. Carter (January 18); K. H. Higson (January 25); E. A. Williams (January 29); N. S. T. Benson (February 3); G. M. T. Kerr (February 8); W. A. H. B. Burnside (February 17); F. G. Frow (March 1); A. J. S. Morris (March 5). F/O. J. R. Cox is transferred from Class A to class C (May 22).

The follg. Flying Officers relinquish their commissions on completion of service:—M. Spurway (April 3); R. H. Clay (Lt., T.A.) (May 1).

The notification in the Gazette of April 3 concerning F/O. M. Brunton is cancelled.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

### General Duties Branch

*Air Commodore* R. H. Verney, O.B.E., to R.A.F. Depôt, Uxbridge, 13.5.34, whilst attending Senior Officers' Tactical Course at Portsmouth.

*Wing Commanders.*—G. S. M. Insall, V.C., M.C., to Station Headquarters, Kenley, 15.5.34, to Command. C. L. Scott, D.S.C., to No. 205 (F.B.) Squadron, Singapore, 30.3.34, to Command.

*Squadron Leader* M. L. Taylor, A.F.C., to R.A.F. Depôt, Uxbridge, 14.5.34, whilst attending Senior Officers' Tactical Course at Portsmouth.

*Flight Lieutenants.*—F. F. W. Hall, to No. 26 (A.C.) Squadron, Catterick, 13.5.34. R. R. Nash, to No. 24 (Comm.) Squadron, Hendon, 14.5.34. A. R. Sarel, to No. 3 Flying Training School, Grantham, 14.5.34. E. H. M. David, to No. 3 Flying Training School, Grantham, 15.5.34. L. T. Pankhurst, to Station Headquarters, Kenley, 10.5.34. H. A. J. de S. Barrow, to No. 3 Flying Training School, Grantham, 13.5.34.

*Flying Officers.*—L. H. Anderson, to No. 3 Flying Training School, Grantham, 13.5.34. L. G. Belchem, to R.A.F. Base, Calshot, 13.5.34. G. R. Brice, to R.A.F. Base, Calshot, 13.5.34. J. P. Cecil-Wright, to R.A.F. Base, Calshot, 13.5.34. J. Constable-Roberts, to Royal Air Force College, Cranwell, 13.5.34. I. A. Critchley, to No. 503 (Co. of Lincoln) (B.) Squadron,

Waddington, 13.5.34. E. Dawson, to No. 3 Flying Training School, Grantham, 13.5.34. H. R. A. Edwards, to Station Flight, Abingdon, 13.5.34. D. B. D. Field, to Royal Air Force College, Cranwell, 13.5.34. T. P. Gleave, to No. 5 Flying Training School, Sealand, 13.5.34. J. G. Glen, to No. 3 Flying Training School, Grantham, 13.5.34. N. C. Hendrikz, to Station Flight, Duxford, 13.5.34. J. N. Jefferson, to Station Flight, Duxford, 13.5.34. R. L. Kippenberger, to No. 5 Flying Training School, Sealand, 13.5.34. T. J. MacDermot, to No. 3 Flying Training School, Grantham, 13.5.34. A. F. McKenna, to Royal Air Force College, Cranwell, 13.5.34. H. W. Marlow, to R.A.F. Base, Leuchars, 13.5.34. H. W. Mermagen, to Station Flight, Abingdon, 13.5.34. H. Pilling, to No. 5 Flying Training School, Sealand, 13.5.34. P. J. Polglase, to Royal Air Force College, Cranwell, 13.5.34.

*Pilot Officer* A. V. Sawyer, to No. 7 (B.) Squadron, Worthy Down, 9.5.34.

### Stores Branch

*Flight Lieutenant.*—R. M. Thomas, to R.A.F. Depôt, Middle East, Aboukir, 2.5.34. F. W. Taylor, to Station Headquarters, Bircham Newton, 11.5.34.

### Dental Branch

*Flying Officer* W. V. A. Denney, to No. 1 School of Technical Training (Apps.), Halton, 18.5.34.

## NO. 3 FLYING TRAINING SCHOOL

THE undermentioned officers have been awarded special assessments as shown hereunder, on completion of a course of *ad initio* flying training at No. 3 Flying Training School, Grantham:—

### Special Distinction

A./Pilot Officer P. H. Dutton.

### Distinguished Pass

A./Pilot Officer C. R. Taylor.

## EXAMINATION OF APPLICANTS FOR GROUND ENGINEERS' LICENCES

The Air Ministry announces that Examination Boards will sit for the purpose of examining applicants for ground engineers' licences at the following places and times:—

- London, weekly, on each Tuesday in July, August and September, 1934.
- Croydon, on the second Friday in July, August and September, 1934.
- Manchester, on the first Friday in August, 1934.

(d) Bristol, on the first Friday in July, 1934.

(e) Glasgow, on the third Thursday in July, 1934.

Applications for licences should be made on C.A. Form 2B, which is obtainable on request, and should be addressed to The Secretary, Air Ministry (C.A.2), Adastral House, Kingsway, London, W.C.2. Applications for extensions to existing licences will also be dealt with at these boards, and such applications should be made on C.A. Form 2D to the above address. When forwarding the application, the applicant should indicate the provincial centre which he wishes to attend for examination, if he is unable to take the examination in London.

Application for examination at the centres named at 1 (c), (d) and (e) above can only be accepted provided that the application, together with the appropriate fees, is received 28 days before the dates specified, and provided also that the total number of applications received is within the capacity of the board. Applicants whose applications are not accepted owing to these provisions will be given the opportunity of early examination in London, or, alternatively, of being placed on a waiting list for the next board to be held in the place in question.

**Cancellation.** Notice to Aircraft Owners and Ground Engineers No. 6 of the year 1934 is hereby cancelled.

# SERVICE NOTES

## Flt. Lieut. Loel Guinness

FLT. LT. THOMAS LOEL EVELYN BULKELEY GUINNESS, M.P., has relinquished his commission in the No. 601 County of London Bomber Squadron of the Auxiliary Air Force on completion of service, and has been granted a commission as Flight Lieutenant in Class "A" of the Auxiliary Air Force Reserve of Officers.

## H.M.S. "Glorious" Home

H.M.S. *Glorious* (Capt. G. C. C. Royle, C.M.G., and Wing Com. A. R. Arnold, D.S.C., D.F.C., Senior R.A.F. Officer) returned to Devonport from the Mediterranean on May 1st, for refit. The squadrons on board, No. 802 (F.F.) and No. 823 (F.S.R.), have been transferred from the Mediterranean Command to the Coastal Area.



**FOR NAVIGATIONAL TRAINING :** A D.H. "Tiger Moth" fitted with a hood for instruction in the art of "blind flying." As previously recorded in *FLIGHT*, a number of "Tiger Moths" so equipped have been ordered for the Royal Air Force. The particular machine illustrated belongs to No. 24 (Communications) Squadron. (*FLIGHT* Photo.)

### No. 22 (Bomber) Squadron

No. 22 (Bomber) Squadron (Sqd. Ldr. C. E. Maitland, D.F.C., A.F.C.) moved from Martlesham to Donibristle, Fife, on May 1st and was transferred from the Inland Area to the Coastal Area with effect from that date. During the present year, two squadrons incorporated in experimental establishments are being reorganised and reconstituted on an effective basis as part of the additions to the Home Defence Force. No. 22 is the first to be so treated.

### Armament Training Camps

No. 12 (Bomber) Squadron (Hawker "Harts"), Andover, and No. 58 (Bomber) Squadron (Vickers "Virginias"), Worthy Down, have proceeded to No. 1 Armament Training Camp at Catfoss, Yorks, and No. 40 (Bomber) Squadron (Fairey "Gordons"), Abingdon, to No. 2 Armament Training Camp at North Coates Fitties,

Lincs, for armament training. These squadrons, therefore, will not be taking part in this year's Display.

### Iraq Inspector, R.A.F.

WING COM. E. L. HOWARD-WILLIAMS, M.C., has been selected as Inspector of the Iraq Air Force at the Ministry of Defence in Baghdad, and has been seconded for this duty as from May 5th. He succeeds Sqd. Ldr. Peter Warburton, who had held the post for four years.

### Upavon-on-Sea

STATION Headquarters, Upavon, and Nos. 3 and 17 (Fighter) Squadrons completed the move from Upavon to Kenley on May 15th, 1934. The R.A.F. Station, Upavon, came under the command of the A.O.C., Coastal Area, with effect from May 16th, and will be permanently occupied by a new station headquarters, and also by Fleet Air Arm squadrons when disembarked.

## DEATH OF MURRAY-PHILIPSON

It is with extreme regret that we have to record that Sqd. Ldr. H. R. Murray-Philipson, A.A.F., died in London on May 24th. He was well known as the extremely energetic Commanding Officer of No. 603 (City of Edinburgh) Auxiliary Air Force Squadron, which he commanded until recently. His keenness for his duties in connection with the Squadron never let him spare himself, although he had for some considerable time been suffering from ill health and had had to undergo several operations. Energy was the outstanding characteristic of Murray-Philipson. He thought nothing of travelling to Edinburgh by a night train on Friday, spending the week-end flying with the squadron (in one case he actually flew down with them to Hendon for manoeuvres and back again) and then returning to London by night train, and ready for business in his office on Monday or Tuesday morning.

Murray-Philipson learned to fly in 1927, and since that time had owned an aeroplane. He was extremely popular with his squadron, and, like all efficient men, he demanded and obtained efficiency from others. He accepted no half measures and everything had to be *right*. As may be imagined, he was



a strict disciplinarian, and his method of dealing with misdemeanours in his squadron, by stopping the "culprits" flying, was invariably successful. No. 603 Squadron was responsible for establishing the first pipe band (in kilts) of the Air Force. During the combined Coast Defence Exercises last year, his squadron, on their own initiative, fitted out a "Wapiti" as a three-seater and participated in the exercises for many hours over the sea.

Apart from his flying activities, he was chairman of the North-Eastern Marine Engineering Co., of Wallsend-on-Tyne; a director of Manvers Main Collieries; M.P. (Conservative) for the Twickenham Division; a member of the Royal Company of Archers, the King's Bodyguard for Scotland; a magistrate and an Assistant County Commissioner for Boy Scouts. In 1923 he married Monica, daughter of Mr. Beasley-Robinson, and he leaves a son and daughter. He was a nephew of Lord Elibank and had a country estate at Stobo Castle, in Peeblesshire. He was present at the Ottawa Conference as personal

assistant to the Chairman of the Federation of Chambers of Commerce of the Empire. Murray-Philipson was only 32 years of age when he died.

# CORRESPONDENCE

*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*

## THE AUTOGIRO

[2931] I think everybody will be pleased to note that Señor J. de la Cierva has been awarded the Wakefield Gold medal for his work in developing the Autogiro. There must be few inventors who have plodded away so steadily and with such faith in rendering practical what appeared at least to be of doubtful value.

For a long time now the Autogiro has been spoken of as the machine for the "man in the street," but it is priced too high to meet much demand from private owners. It appears to have an unnecessarily high-powered engine for the private owner, particularly as he does not necessarily demand such a high performance as that afforded by the present type.

I have heard many discussions among civilian pilots, and it seems clear that there is a demand for a lower-powered, two-seater model. Surely, too, its appearance might be improved. It is difficult to combat criticism.

"PRIVATE OWNER."

"Somewhere in England."

## FREE INSTRUCTION

[2932] We note with interest Mr. Albert Braid's letter in your correspondence columns of your issue of May 17th. We would like to bring to Mr. Braid's notice that under our Free Instruction plan, all purchasers are handed over to approved flying schools, such as Messrs. Airwork's school at Heston, where Capt. Baker is the chief instructor, Speke Aerodrome at Liverpool, or Brooklands, according to the centres which are most convenient to the purchasers, and we feel perfectly happy that under the jurisdiction of such instructors as are found at the schools we have amply provided against the pitfalls set out in Mr. Braid's letter.

We should like to take this opportunity of informing him that our plan has worked with very great success in all instances.

B. S. ALLEN,  
Aviation Manager,  
Henlys, Ltd.

385, Euston Road,  
London, N.W.1.

# THE INDUSTRY

## SUCCESSES AT DONCASTER

THE three machines of the Brooklands Aero Club comprising the winning team in the Doncaster Interclub Competition, held last Saturday, used National Benzole Mixture for their fuel and Wakefields' Castrol lubricating oil.

## A LODGE SUCCESS

THE Caudron-Regnier monoplane with which M. Massotte gained second place in the Coupe Deutsch de la Meurthe—a report of which appears on page 531—was fitted with Lodge Plugs.

## NOT SO BLACK AS IT IS PAINTED

WE wish to draw attention to a slip that occurred in the advertisement of D. Lewis, Ltd., in last week's issue of FLIGHT (page xxvi). In this advertisement D. Lewis offered for sale an "Unused soiled Black Type Irvin Air Chute." This is not a new type of parachute, but refers, of course, to the "Back" Type pattern!

## SERRATING SHEARS

NOW that the majority of aircraft manufacturers and repairers use serrated-edged tape and fabric patches on wings instead of the frayed-out edge which was in vogue some years ago, they will be interested in shears which are sold by Brown Bros., Great Eastern Street, London, E.C.2, especially designed for cutting this serrated edge. These shears, known as the Pinkrite Serrated Shears, are sold in two models, the former a heavy one and the latter a lighter, more pointed model, designed for cutting in corners and round curves. Both are self-sharpening and need no attention whatsoever.

## MISS BATTEN'S AUSTRALIAN FLIGHT

A PROPOS Miss Jean Batten's splendid flight from England to Australia, it may be of interest to note that, as in the case of Mrs. Mollison's (then Miss Amy Johnson) record flight in 1930, K.L.G. plugs were used throughout. Needless to say, Smith's instruments formed part of the equipment of her "Gipsy Moth," while the fitting of "modern improvements," such as the Reid & Sigrist Turn Indicator, gave Miss Batten an advantage over "Amy" in an undertaking like a flight to Australia. Refuelling was in the capable hands of "Shell," and C. C. Wakefield & Co., Ltd., have received the following cable from Miss Batten:—"Throughout whole flight, various temperatures, engine ran perfectly on Castrol XXL. There is none better."



## PUBLICATIONS RECEIVED

*Aeronautical Research Committee Reports and Memoranda*, No. 1557. *Effects of Friction in Airscrew Drives in Damping Torsional Vibration*. By B. C. Carter. February, 1931. Price 1s. 6d. net. No. 1567. *Flexural and Shear Deflections of Metal Spars* (Part 1). By I. J. Gerard and H. Boden. September, 1933. Price 1s. 6d. net. London: H.M. Stationery Office, W.C.2.

*Technical Report of the Aeronautical Research Committee, 1932-33*. Vol. I. Price £1 17s. 6d. net. Vol. II. Price £2 net. London: H.M. Stationery Office, W.C.2.

*The Book of the B.S.A. Three-Wheeler*. By Harold Jelley. Price 2s. 6d. net. London: Sir Isaac Pitman & Sons, Ltd.

*Catalogue of Books on all Technical Subjects*. April, 1934. London: W & G. Foyle, Ltd., 119-125, Charing Cross Road, W.C.2.

*Catalogue: Chronograph Watches*. London: S. Smith & Sons (Motor Accessories), Ltd., 179-185, Great Portland Street, W.1.



## NEW COMPANIES REGISTERED

AVIATION FINANCE, LTD., 293A, Camberwell New Road, S.E.5. "Court Showrooms." Capital, £3,000 in £1 shares. To carry on the business of dealers in and hirers and letters out on hire and hire purchase of motor cars, motor cycles, aeroplanes, motor boats, and all kinds of machinery, etc. The directors are: Frank J. Wollard (permanent), 175, Camberwell Grove Chambers, S.E.5. Brian B. Woollard, 14, Eynella Road, S.E.22 (both directors of Steele Griffiths & Co., Ltd.). Solicitors: Arthur E. Eves & Jones, 25, Mark Lane, E.C.3.

HARLOW FLYING FIELDS, LTD., Theobalds Lane, Cheshunt. Capital, £1,000 in £1 shares. To own, charter and let on hire aeroplanes, motor boats, cars and lorries; to purchase, build and maintain aerodromes, hangars, landing places, repair shops, garages and petrol filling stations, etc. The first directors are: Arthur J. H. Ashby, 16, The Drive, Chingford, engineer (director Harlow Mill, Ltd.). Henry E. Mayes, Harlow Mill, Harlow, Essex. Secretary: A. J. H. Ashby.

WRIGHTSON AIRCRAFT SALES, LTD.—Capital £1,500, in £1 shares. To carry on the business of manufacturers and repairers of and dealers in aerial conveyances, aircraft, motor cars and mechanically-propelled vehicles of all kinds, etc. The first directors are:—Geo. A. R. Malcolm, "Highdale," Warren Cutting, Kingston Hill, Surrey. Gerald G. W. Farquharson, Hanworth Club, Feltham, Mdx. Remuneration: As fixed by the company.

## INCREASES OF CAPITAL

SOUTHERN AND CENTRAL AIR LINES, LTD., 7, Park Lane, W.1.—The nominal capital has been increased by the addition of £19,900 in £1 ordinary shares beyond the registered capital of £100.

SOUTHEND-ON-SEA FLYING SERVICES, LTD., The Aerodrome, Rochford, Essex.—The nominal capital has been increased by the addition of £3,500 in £1 ordinary shares beyond the registered capital of £1,500.



## PATENT AERONAUTICAL SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

### APPLIED FOR IN 1932

Published May 31, 1934

36,676. J. E. ELLOR. Air-cooled condensers for aircraft. (409,834.)

### APPLIED FOR IN 1933

Published May 31, 1934

20,284. DEUTSCHE WERKE KIEL AKT.-GES. Aircraft-catapulting apparatus. (409,937.)

26,628. M. L. GIANOLI. Stabilizing devices for aircraft. (409,994.)

## CHANGE of ADDRESS of "FLIGHT"

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